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The Muisca Calendar: An approximation to the timekeeping system of the ancient native people of the northeastern Andes of Colombia.

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a été évalué par un jury composé des personnes suivantes:

_____
président-rapporteur

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directeur de recherche

_____
membre du jury

Résumé

Le but de ce travail est d'examiner et de compléter le modèle proposé par le prêtre José Domingo Duquesne de Madrid (1745-1821), concernant le calendrier de l'ancienne culture Muisca, située en Colombie centrale. Ce modèle, écarté par les chercheurs à la fin du 19ème siècle, a longtemps été considéré comme une belle invention. Cependant, une analyse détaillée de son travail montre que l'interprétation du système de gestion du temps lui fût rapporté par les autochtones. Ceci peut-être démontré par le biais de données ethnohistoriques et archéologiques confirmant que Duquesne n'est pas à l'origine d'un tel système. Nous examinerons cette hypothèse à travers, notamment, des cérémonies Muisca relatées par des chroniqueurs espagnols du 15ème siècles. Ces cérémonies correspondent à un cycle astronomique de conjonctions des planètes Jupiter et Saturne, ce même cycle pouvant se superposer au cycle de 60 ans décrit par Duquesne à propos du siècle acrotome Muisca. Il en est de même pour les outils de calculs des prêtres Muisca dont parle Duquesne. Une pierre sculptée, découverte dans le village de Choachi (Cundinamarca) témoigne de tels éléments numériques.

Mots clés: Archeoastronomie, Muiscas, Colombie, Calendrier

Abstract

The aim of this project is to review and expand upon the model proposed by Father José Domingo Duquesne de la Madrid (1745-1821) regarding the calendar of the ancient Muisca culture of the central Colombia. This model was dismissed by scholars in the late 19th century, calling it just a simple invention of a clergyman; however, a detailed analysis of Duquesne's work shows that his interpretation of the timekeeping system was based on information given to him by indigenous informers. Based on his work, we can be derive somewhat indirectly, some aspects of the calendar that apparently were not understood by the priest. This confirms that such a system was not his own invention. Ethnohistorical and archaeological evidence provides support for Duquesne's calendar model. Massive Muisca ceremonies described by 15th century Spanish chroniclers, is examined, and the occurrence of such ceremonies seem to match the astronomical cycle of conjunctions of the planets Jupiter and Saturn, wich also agrees with the 60-year span described by Duquesne as the Muisca Acrotom Century. Archaeological artifacts, such as a carved stone found in the village of Choachi (Cundinamarca) that shows numerical elements supports Duquesne's model that suggests this stone was a calendar calculation tool for Muisca priests.

Keywords: Archaeoastronomy, Muiscas, Colombia, Calendar

Resumen

El objetivo del presente trabajo es reexaminar y complementar el modelo propuesto por el padre José Domingo Duquesne de la Madrid (1745-1821) acerca del calendario de la antígua cultura Muisca del centro de Colombia. Tal modelo había sido descartado por investigadores de finales del siglo XIX, consideránosele simplemente como una ingeniosa invención del sacerdote. Un análisis detallado de su trabajo muestra, sin embargo, que Duquesne estaba únicamente interpretando un sistema de manejo del tiempo que le fué comunicado por sus informantes indígenas. Con base en su trabajo puede derivarse de manera indirecta varios aspectos del calendario que aparentemente no fueron notados por el religioso, siendo esto una confirmación que tal sistema no era de su invención. Se presenta evidencia etnohistórica y arqueológica que soporta dicho modelo del calendario. Se estudia el caso de ceremonias masivas muiscas descritas por cronistas españoles del siglo XV cuya ocurrencia parece concordar con un ciclo astronómico de conjunciones de los planetas Júpiter y Saturno, el cual esta también de acuerdo con un lapso de sesenta años descrito por Duquesne para el Siglo Acrótomo Muisca. Artefactos arqueológicos como una piedra labrada encontrada en el municipio de Choachí (Cundinamarca) muestra elementos numéricos que concuerdan con el modelo de Duquesne, sugiriendo que se trataba de una herramienta de cálculo para el sacerdote Muisca.

Palabras claves: Archeoastronomía, Muiscas, Colombia, Calendario

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For

my father, Gustavo A. Izquierdo

and

my mother, Celina Peña

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[1] http://www.stellarium.org/
[2] http://www.astro.com/swisseph/

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Introduction

I first became interested in the Muisca Calendar in the mid 1990s, when I was a bachelor's student in Anthropology at the Universidad Nacional de Colombia. However, it was not until 2004, when I taught archaeoastronomy at the Astronomical Observatory at the same university, that I began to seriously research this topic. As result of several discussions with my colleagues Francisco López and Juan David Morales about the Muisca calendar and astronomy, I took on the arduous task to carefully read and analyze the texts of José Domingo Duquesne de la Madrid, a late 18th century (1795) priest who was seemingly in close contact with the descendants of the Muisca Indians. From these texts, I obtained a plethora of information about the Muisca timekeeping system. Despite the fact that Duquesne's work was, however, dismissed by later generations of scholars, who considered it a product of the priest's imagination, I started to inquire whether such opinion was fully justified. After four years of work analyzing his writings, checking for clues in the ethnohistorical, archaeological, and astronomical sources, my current opinion is that Duquesne's work has to be reconsidered as a an important source of information about this topic, and that the dismissal of his work seriously slowed our understanding of the calendar and astronomy of the Muiscas. This model cannot be considered, however, as a definitive description of the calendar of the precolumbian Muisca, but as a legitimate piece of the whole jigsaw, result of the Duquensne's effort to interpret and to describe an ethnographically-

obtained timekeeping system. The main goal of this project is to introduce, analyse and complement the Duquesne's model of the Muisca Calendar, providing preliminarly information supporting the model, from ethnohistorical and archaeological sources.

In Chapter 1, I introduce the theory of archaeoastronomy, and especially the framework that will allow me to frame the hypothesis that will be described throughout the course of this work. In chapter 2, I provide a succinct introduction to the Muisca culture, helping the reader who is unfamiliar with such a culture.

Due to the fact that Chapter 3 is the product of a careful analysis of Duquesne's description of the Muisca Calendar, it is the densest part of this dissertation. Numerous explanations of the texts are given in the chapter in order to give the reader a better understanding of the priest's work, which is, in many parts, difficult to interpret. New calendar elements, not explicitly described by Duquesne can be deduced from his work are shown, for example the *Cycle of Ata* and the *Zocam Extended Centuries*. Furthermore, the analysis links the described calendar with the descriptions of the earlier chronicler Fray Pedro Simón (1625), and aims to construct a general model of the calendar, that comprises mythical time-spans up to a duration of almost six thousand years.

In Chapter 4, ethnohistorical sources are explained, in particular those that relate episodes associated to the Muisca religion provide clues supporting the analysis started in Chapter 3. The study of a massive ceremony held by the Muiscas in 1563 in a village known as Ubaque, led to the discovery that this ceremony occurred during an astronomical conjunction of the planets Jupiter and Saturn, phenomenon that significantly fits with the Acrotom Century described by Duquesne. Another massive ceremony described by Juan Rodríguez Freyle (1636) is also studied, leading to the possibility that it was performed an Acrotom Century before the Ubaque ceremony.

Chapter 5 addresses the existence of some archaeological artifacts that suggests the possibility of the presence of a basic system of arithmetic notation. The Choachí Stone in particular stands out; it is a small stone slab that shows an arrangement of figures that represent values that can be associated to the calendar. It is suggested that such a stone could be considered as a 'pocket device' to perform calendar computations. Examples of other archaeological artifacts are also discussed, as in the case of a conch trumpet and spindle whorls showing, in their decoration, the graphical theme of a bird-head, already present in the Choachi Stone, which were possibly used as containers of numerical information. Future research may wish to analyze this topic further.

Appendix A includes a complete transcription of Duquesne's writings, in their original Spanish version. Appendix B presents several tables showing the *Muisca Centuries* (*Acrotom* and *Zocam*) and the *Cycle of Ata*. Tables for the higher mythical time spans are also presented. These tables were generated by a computer program developed conforming to Duquesne's descriptions, which I wrote in C language for the purpose of this research.

Part I

Theoretical Background

Chapter 1

The archaeoastronomy

1.1 Definition

Archaeoastronomy is an auxiliary discipline of Archaeology, and can be defined as the "study of the practice of astronomy in ancient cultures using both written and unwritten records" (Aveni, 2003), with special emphasis on it being a "study of the sky-watching practices made with a cultural purpose"(Belmonte, 2006) in order to understand the way ancient people "understood the phenomena in the sky, how they used phenomena in the sky and what role the sky played in their cultures" (Sinclair, 2006). This approach has lead to the proposition of alternative names for the discipline, for example Astronomy in the Culture or Cultural Astronomy (Ruggles and Saunders, 1993).

Although closely related, Archaeoastronomy is not the study of the ancient astronomy, since *astronomy* "is a culturally specific concept and ancient peoples may have related to the sky in a different way" (Ruggles, 2005). Hence, the study of ancient astronomy and the historical process that lead to the formation of modern astronomy is part of the History of Science, by means of its methods and goals, and is formally a sub-discipline of History.

1.2 History and research trends

The first studies in archaeoastronomy can be dated back to the 19th century, Norman Lockyer's classic book *Dawn of Astronomy* (1893), discusses astronomical elements associated with the orientation of Egyptian monuments. However, it is not until the 1960's that the works of Alexander Thom (1974; 1975) and Gerald Hawkins (1965; 1974) on the astronomical orientation of the megalithic monuments of the British Isles attracted the interest of both archaeologists and astronomers to inquire whether astronomical phenomena played a role in ancient cultures.

The first meeting to unite many researchers in archaeoastronomy was held in 1981 in Oxford, England. This meeting brought to light the staggering differences in methodology and research objectives between the scholars of Europe and America, leading to the publication (in two volumes) of the meeting's proceedings which defined the two current main trends of research in this field: The *Brown Archaeoastronomy* and the *Green Archaeoastronomy*. The former was named for the color of the paper cover of the volume describing the work of the American researchers, who concentrated on the study of the Amerindian societies, and included works that dealt with archaeological, ethnographic and ethnohistorical sources in order to inquire about the ancient astronomical knowledge of the studied cultures, (as in the case of the Maya and their calendar, which deserve special attention (Aveni, 1980)). From this publication, it is evident that, the study of timekeeping systems had been an active topic of research in this branch of the discipline. The latter publication, the *Green Archaeoastronomy*, corresponds to the European research, and it focuses on the astronomical alignments of monuments, specially the megalithic archaeological sites of Europe. Its methodology relies on rigorous statistical analysis to determine if the studied alignments are a product of chance, or whether they are intentional phenomena.

Both sides criticized each other. the criticism of the Brown Archaeoastronomy

lies in its apparent disregard for statistical rigor where astronomical orientations in ancient monuments is concerned. The criticism of Green Archaeoastronomy lies in in the fact that it does not provide a comprehensive enough interpretation of components of ancient societies (Kintigh, 1992).

In general, Green Archaeoastronomy is best at answering the question: *there was really an astronomic intention in the construction of a given site?*, whereas the Brown Archaeoastronomy does better with the question: *how it was the astronomic intention of a given past culture?*. Most of the work done in archaeoastronomy today could be classified under one of these approaches, although currently many new works integrate both approaches.

1.3 The issues of a maturing discipline

Unfortunately, archaeoastronomy has been viewed with skepticism by the archaeological community, due in part to the many works that have been conduced by researchers from non humanistic studies, especially astronomy. Although they are very rigorous in the astronomical part of their research, they lose credibility when they generate wrong interpretations from an archaeological point of view. Similarly, researchers without an astronomical formation have proposed archaeological theories based on erroneous astronomical postulates, (see for example Milla Villena 1983). Juan Antonio Belmonte addresses a key element of this problem, when he argues that archaeoastronomy is defined as a 'no-man's land', where both astronomers do not recognize it as their own, nor do anthropologists fully understand its usefulness. Any individual without academic formation could attribute himself the title of archaeoastronomer in order to posit wild theories that are absolutely unfounded, horrifying the social scholars who will as a consequence consider archaeoastronomy as a 'lunatic fringe' expression (Belmonte, 2006).

Despite this problem, archaeoastronomy, in the same way that disciplines as Archaeology, Anthropology and Astronomy arose after a period of immaturity, is living such a process, working to get rid of these 'fringe aspects' and thus become a well-established academic discipline. Methodological foundations as the interdisciplinary effort of anthropologists and astronomers, have turned into the definition of a new kind of professional designation, as Belmonte (op. cit.) indicates: "After more than one decade of field work, my current opinion, and the one of many of my colleagues is: what is really needed is an almost complete recycling of the current astronomer or anthropologist, who must become into a truly archaeoastronomer, forgetting many of the epistemological references learnt during his long years of study and learning new ones that are completely unknown to him". Despite these efforts to establish a general theory on archaeoastronomy, the creation of such a theory is still a work-in-progress(Iwaniszewski, 2001, 2003; Belmonte, 2006).

Belmonte provides theoretical elements to help the discipline avoid the "fringe" trap, and thus gain credibility in the academic community. I consider these elements very important, because I intend to frame the ideas I discuss in this dissertation into this theoretical 'safety zone'.

1.4 The Belmonte's classification of archaeoastronomical research

Belmonte (op. cit.) proposes a concise framework to classify the current work in archaeoastronomy, which divides the research into five categories of credibility (from the more to the less credible) and are defined as: Formal work, Serious speculation, Endearing speculation, Wild speculation, and *Making money*[1].

[1]Term in english in the original text in spanish.

As a scholar coming from the exact sciences (Astrophysics), Belmonte emphasizes the use of the principle named in latin *Testis unus, testis nullus*, which states that "an unique case of something... is not enough evidence to elaborate a hypothesis, and much less, a theory since it cannot be falsifiable" (op. cit.) . He also proposes the use, as far as possible, of the rule of *Occam's razor* and the *Principle of Economy* to distinguish the boundary between what can be considered science and not. Therefore, in his opinion, such a boundary "could be located in some point between the Endearing speculation and the Wild speculation" (op. cit.) . Succinctly, these categories can be described as follows:

Formal work When a research produces a theory that is supported by a rigorous methodology and solid evidence coming from astronomical, archaeological, ethnohistorical and/or ethnographic sources.

Serious speculation When a work, based on a rigorous methodology, proposes a very reasonable hypothesis, but lacks of complete supporting evidence from the mentioned sources.

Endearing speculation When a work only can propose a very reasonable hypothesis, lacking of any supporting evidence.

Wild speculation When the researcher, faced to the uncertainties, fill the holes of evidence with his own speculations and falls in the temptation to convince himself of the truth of such hypothesis. Thus, in an act of enthusiasm (and pareidolia), his proposed model turns into a 'truth'.

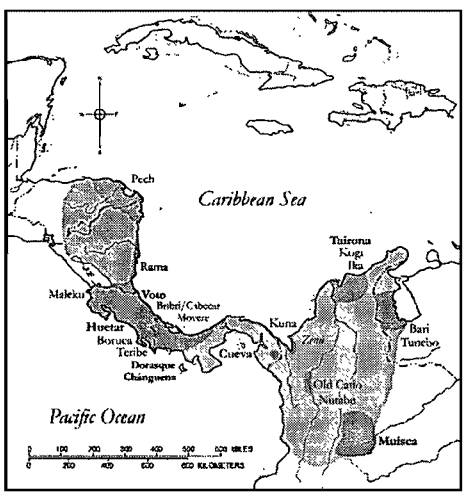
Making money When the archaeoastronomer turns to the dark side. The researcher discovers that such fabricated truths sell very well in the market of the 'fringe literature', and his work becomes a best seller aside akin titles of UFOlogy, Astrology, New Age. This is quite good for his budget, but certainly *not* for Archaeoastronomy, as an academic discipline.

Formally, an hypothesis is a conjeture with supporting data, and a conjecture is simply an a priori explanation. Belmonte coloquially describes these ranges of 'speculations' to address these differences. Although the freedom to speculate (to conjeture, to hypothesize) is useful in Science to get new ideas around a problem, these have to be treated only as working tools, not truths. The validation or invalidation of several hypothesis around a problem will give to the researcher a map indicating what could be the solution to a problem, and of equal importance, what is **not** the solution. Furthermore, Belmonte's framework is valuable because it provides a basis to classify a given explanation in such a range, in order to bring the researcher the capability to know the scope of such idea, allowing him to use it correctly as a methodological tool, and not letting him fall in the dangerous fringe trap.

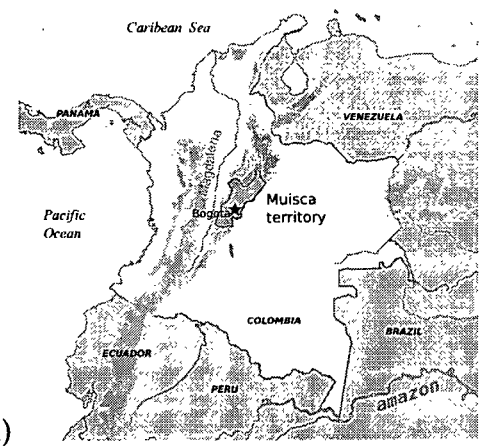
Chapter 2

The Muisca Culture

2.1 Origin and chronology



(a)



(b)

Figure 2.1: (a) Map of the Chibcha world. Figure from Hoopes (2005). (b) Location of the ancient Muisca territory on the current Colombia.

Muisca culture developed in the *altiplano* located in the Northeastern Colombian Andes (figure 2.1b). The origins of Muisca culture are attributed to migrations of Chibcha-speaking groups coming from the caribean coast during the 8th century AD, who either replaced or fused (which is an on-going topic of dicussion (Rodríguez, 1999)) with former populations of the *altiplano* known as the *Herrera*

Culture. Nevertheless, since this century, several distinct changes in the archaeological record have been observed suggesting a tendency towards increasing social complexity in the region, which contrasts sharply with the simple material culture of the *Herrera* (Lleras and Langebaek, 1987; Lleras, 1995). The appareance of the Muisca culture seems to belong to a series of social phenomena leading to the social complexity of cultures along the Intermediate Area since as early as the 4th century AD (Hoopes, 2005). As most of these social changes involved groups belonging to the Chibcha linguistic family and some researchers (Hoopes, 2005; Warwick, 1997) have proposed the regional concept of a 'Chibcha World' (figure 2.1a), in order to approach such groups and their associated cultural development from a wide perspective.

A succint chronology for the *altiplano* can be therefore proposed as follows (Lleras, 1995; Rodríguez, 1999):

- Preceramic: ±20000 BC — 1500 BC
- Herrera: 1500 BC — 800 BC
- Muisca: 800 AD — 1536 AD

It is widely accepted that Preceramic populations arrived in this region from the Magdalena River Valley via previous ancient migrations attributed to the pursuit of megafauna found in the *altiplano*. The *Herrera* culture can be asociated with a formative stage, however, very little is known about this period. Following the precolumbian Muisca period, the 16th century marked the arrival of Europeans, this beggining a colonial period that spanned from the 16th to 18th centuries, in it, assimilated a lot of cultural elements from new power, but also achieved to maintain most of its native cultural traits.

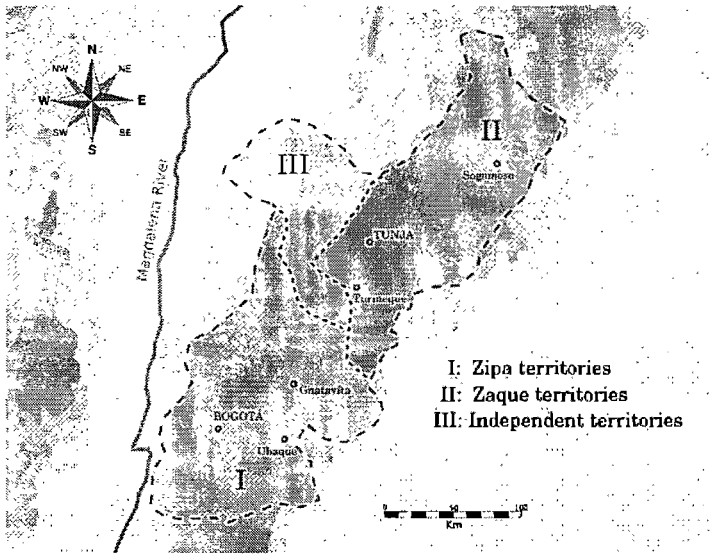


Figure 2.2: Territories of the main Muisca chiefdoms in the times of the European conquest. Based on the map published by Falchetti and Plazas (1973).

2.2 Political organization

The Muisca were characterized politically by a complex system of chiefdoms, which during the first contact with the Europeans formed into two main divisions occupying the northern and southern parts of the Muisca territory, composed by chiefdoms and subject to two Rulers: the *Zaque* in the north and the *Zipa* in the south. The *Zaque* controled the chiefdoms of *Sogamoso*, *Turmeque* and *Tunja*, which was his capital. The *Zipa* ruled over the chiefdoms of *Guatavita*, Ubaque and Bogotá, with the current day city of Funza as his capital (see figure 2.2). At the same time, each one of these subjected chiefdoms was composed of other smaller chiefdoms, which were also subdivided until a mininum political unit of the Muisca society, known as the *uta*. According the chroniclers, these two confederations of chiefdoms were in conflict, due to the expansionist tendencies of both rulers. However, some chiefdoms to the northeast of the territory, maintained an independient existence, sometimes intervening, depending the circumstances, in favor of the Zaque or the Zipa. In the eye the medieval-european Spaniards, they viewed in

the highlands an ashaming very organized set of 'kingdoms', in contrast to the 'savage hordes' of the low lands; however, these kingdoms were ruled by cruel and despotic kings wishing to control and subjugate those territories. The Europeans were so impressed with the new discovered society, that associated it with a burgeaning empire. In fact, declaring heroic victories over vast, despotic and cruel empires was a very attractive idea to the Spanish conquerors, since they needed to gain prestige when justifing their conquests before the Spanish crown in order to legitimize newly acquired property and the profits derived from it. Consequenlty, this notion of the 'Muisca empire', as depicted by the european chroniclers since the 16th century, must to be considered in light of their agenda, and has been contested by current scholars (Correa, 2004), who have established that the Muisca never reached state organization, rather it was organized as a complex system of subjected chiefdoms governed by series of matrilineal descended lineages of chiefs named *cacique* by the spaniards and *sijipcua* in the Muisca language (Villamarin and Villamarín, 1999). The realm of each *cacique* took on the name of its ruler who was considered divine by his people. Consequently, the *cacique*'s power trascended the political domain of Muisca society into the religious sphere, consequently, this created the effect of being legitimately linked with the sacred aspects of the Muisca world in the eyes of his people. The duties of the *cacique* were aimed to warrant, from both in the secular and sacred domains, the reproduction and the health of his society (Correa, 2004). In order to achieve this end, the *caciques* followed a rigorous training regimen since early childhood, aimed at the proper fulfillment of their duties, whose performance extended after death, becoming their mummified bodies as part of the collective memory of the ancestors. These were kept in such sacred places as temples or caves, under specialized care of priests.


(a)

(b)

Figure 2.3: (a) Gold *tunjo (Museo del Oro).* (b) Muisca ceremonial ceramics *(Museo Arqueológico de Sogamoso).*

2.3 Economy

The economy of the Muisca was based principally on the agriculture. Their crops consisted mainly of high-land plants as corn, potatoes and quinua; however, some Muisca chiefdoms had territories the low lands profiting of its natural resources. In an effort to control the lacustrine terrains peculiar to the *altiplano* the Muisca constructed channels which allowed them to not only irrigate their fields, but to fish, which contributed to their diet. An alternative source of animal protein was the *curi*[1] (Guinea Pig), which was domesticated. Deer was also hunted, however its consumption was restricted to the religious practices of the elite.

Mining and mineral extraction was practiced by the Muisca, especially the explotaion of emeralds and salt. These resources were traded with neighbouring groups, for such available commodities as cotton and gold, highly appreciated by the Muiscas. Gold was needed to supply the artisan goldsmiths (*plateros*) who covered the demand for votive gold figurines (*tunjos*) used to perform religious offerings (figure 2.3a).

[1]Also known as *cuy, Fuquy* in Muisca language.

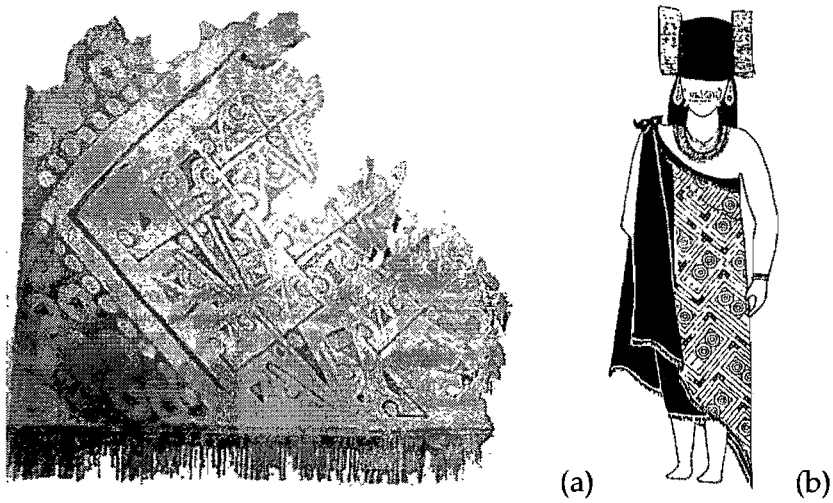


Figure 2.4: (a) Muisca painted blancket fragment *(Museo del Oro)*. (b) Wearing of blanckets. From Cortéz (1990).

Imported cotton was used to manufacture blankets (which were also exported), which was a highly specialized industry in Muisca society (see figure 2.4). These blankets were commonly used as clothes, and, special painted blankets were considered highly valued goods. Unfortunately, a few scraps have been conserved in museum collections. However, numerous decorated stone spindle whorls made in stone (see chapter 5), are better represented, thus attesting to the large scale of this industry.

Another important industry was pottery, which was manufactured at on a very large scale and mostly produced utilitarian and domestic vessels, more specifically the manufacture of special big pots used in the extraction of salt, which were used to evaporate salty water until obtaining a block of salt which was then extracted after cracking the ceramics. However, special ceremonial vessels were produced, which differred from the utilitarian ones in terms of their quality and decoration the elaborated geometrical designs in its decoration (see figure 2.3b) .

Other imported goods were marine strombus conchs, used for ceremonial ocasions; in addition to another goods associated with the religion, as hayo (coca),

yopo, tobacco and exotic feathers.

2.4 Religion

Religion was managed by specialists known as the *Xeques*, *Mohanes* or *Ojques*, who alongside the caciques and enjoyed a similar level of prestige and power, including the right to intervene in political affairs (see chapter 4). The historical accounts refer to them as specific type of priests, who underwent a special training from an early age in places named as the *Cucas* (Correa Aguirre, 2001). This training was very similar to that undertaken by cacique initiates, and consisted of long periods of fasting, locked up inside a ceremonial house. The iniciates were forbidden to leave the house or have any contact with sunlight during their seclusion, for that reason, the ceremonial houses were built with teh intention of having a permanent semidark interior. The initiates were instructed by older Xeques during the nights, and taught about the skills required by priesthood. Such fasting lasted for about four to seven years, and included a restricted lean diet, and the restriction of the sexual habits of the young iniciates, which were only allowed once the iniciate passed a series of tests completing the fast. In an similar fashion to the the caciques, the priesthood was transmited through matrilineal lineages, and normally each *cacique* had several *Xeques* at his service.

The details of the religious rites performed by the Muisca priests are not well known, since the *Xeques* were strongly persecuted and killed during the Spanish Conquest and the early colonial period. The historical archives provide descriptions of ceremonial activities known as *borracheras* (see chapter 4), which involved the use of psychotropic plants, as used in most of the Native American religions. Chroniclers also emphasize the existence of special children used in sacrifice rituals, brought from foreign lands in the eastern plateau of Colombia at very young

age and were raised by the priests following a similar training as the *Caciques* and *Xeques*. These children were sacrificed in special ceremonies at the set of their adolescence.

As I will dicuss in chapter 4, historical records provide data referring to possible astronomical elements conforming to the Muisca religion, suggesting that the astronomical and timekeeping knowledge was a mandatory skill of the *Xeques*. Their systematic extermination by the Spaniards only served to form a large gap in our understanding of the these aspects of Muisca culture.

The main religious center of the Muisca culture was located in the present-day city of Sogamoso[2], where the Spaniards were impressed by the sizeable ceremonial structure found there, described by the chroniclers as the 'Temple of the Sun', later destroyed during the conquest (Simón, 1625). Although described as a temple by the Europeans, it was not a public place, rather it was accesible only to the priesthood and served as a place to iter and care for the mummies of distinguished ancestors as well as the storage of valuable objects that served as religious paraphernalia.

The Muisca worshiped figurines made of gold, copper or wood and wrapped in cotton cloths, named by the spaniards as *tunjos*, *santillos*, or *ídolos*. These were possesed by both the common people and elite and were usually kept on homes, fields of crops, caves and ceremonial houses. These figurines were the preferred plunder of the spaniard's idolatry eradication offensives, since they were made of gold (Correa, 2004).

Among the deities that made up the Muisca religion described by the chroniclers, two stand out *Bachue* and *Bochica*. *Bachue* was said to be the mother of mankind. She emerged from a sacred lake named *Iguaque*, carrying a very young boy who, at the set of adulthood married her and thus they spawned all people

[2]Whose name is a variation of the Muisca word *Suamox* that means 'House of the Sun'.

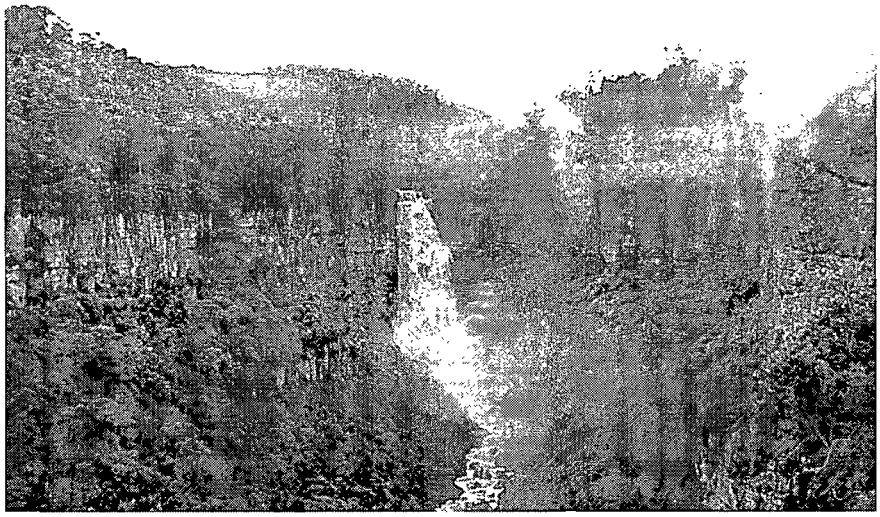


Figure 2.5: *Salto de Tequendama*. Photograph by Francisco A. Zea.

into the world. When they reached old age they transformed into snakes and returned to the sacred lake from which they had emerged (see figure 2.6). Bochica is their civilizor hero, it is said that long ago he arrived into the Muisca region and traveled across the territory teaching the people such skills as agriculture, weaving, and timekeeping. After this, his image became associated with the sun. According to tyhe myths, he performed fantastic feats, such as creating the *Salto de Tequendama*, a high water fall currently located in the southern end of the *Sabana de Bogotá* (see figures 2.5 and 2.7) in order to save people from a massive flooding that covered part of the Muisca World. It is said that Bochica disapeared in the town of Iza, in the northeastern part of the territory. This personage will be important in our analysis of the Muisca calendar (see chapter 3).

2.5 The Muisca after the colony period.

Although the Muiscas survived along the colony period (1537-1810), during the processes of Colombian independence in the 19th century they lost their rights to

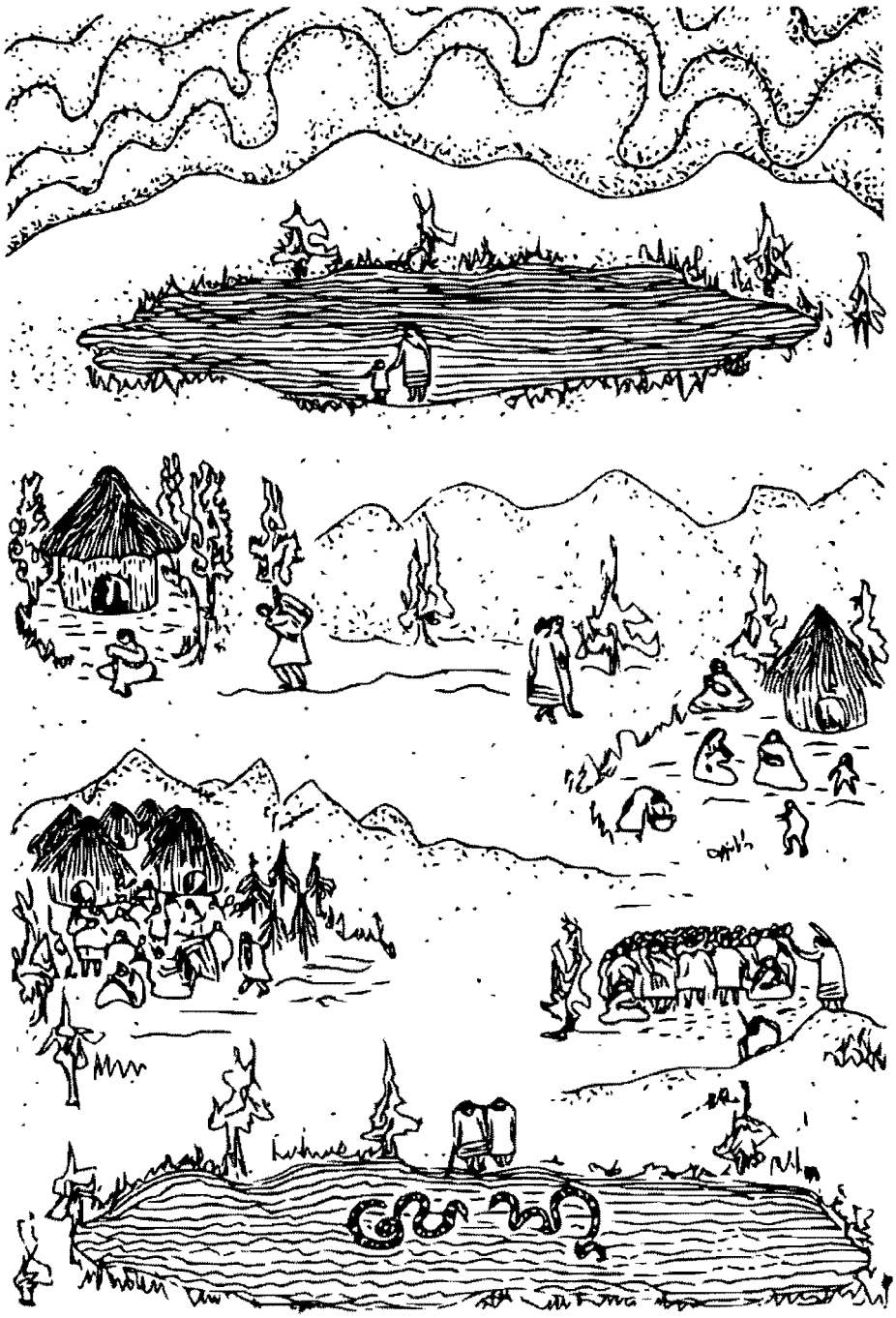


Figure 2.6: Artistic representation of the Bachue's myth. From Peña (1972).

Figure 2.7: Artistic representation of the Bochica's myth. Peña (1972).

communal lands *(resguardos)* granted to them by the former Spanish administration. Under the new establishment, they were progressively forced to sell their lands to landowners. Thus they culturally vanished in the 19th century as a recognizable ethnic group, mixing with Creoles and becoming the majority of agricultural laborers in today's provinces of Boyacá and Cundinamarca. Most of the original Muisca cultural features are now dispersed and mixed with European traditions in the current population. In 1991, with the proclaiming of a new Political Constitution, the indigenous groups acquired more political rights, so, there exist currently some efforts of small populations claiming direct descendant of the Muiscas to rescue and keep the ancient traditions, seeking the reconstruction of a lost identity, after more than 470 years of heavy assimilation (Durán, 2005).

Part II

The Calendar

Introduction

This part II is the product of my analysis of the description of the Muisca Calendar written by the priest José Domingo Duquesne in the end of 18th century. As Duquesne's work is not easy to read, my research was centered to understand his work, in order to evaluate its validity as a ethnohistorical source. This analysis process not only allowed me to verify the reliability of his work, but, with the aid of alternate information coming from other chroniclers, to deduce additional inherent features that were not originally described by the priest .

Chapter 3 must to be seen as a *reconstruction of the Duquesne's model*, but **not** as a definitive model of the Muisca Calendar. As the product of a reflection of a colonial clergyman about the memories of the late 18th century Muisca indians, we cannot concede it all the truthfulness due to our ignorance of all the circumstances about the obtaining of his data, and how the indian's timekeeping vision could have been affected after three centuries of contact with Europeans. However, as it will be shown here, Duquesne's work is a entirely valid starting point in the process of understanding the timekeeping customs of this culture. A lot of archaeoastronomical, ethnohistorical, archaeological, and perhaps ethnographical work is yet needed in order to arrive, consequently, to a final conclusion about this issue. Part III will show a preliminary effort towards this goal.

Chapter 3

Considerations regarding the analysis of José Domingo Duquesne's Interpretation of the Muisca Calendar

3.1 The work of José Domingo Duquesne

José Domingo Duquesne has obtained a place in Colombian history for being one of the first researchers to pursue the study of the Muisca culture. Born in Santafé de Bogotá in 1745, he excelled in his studies in the Colegio Mayor y Seminario de San Bartolomé, where he earned his doctorate in Theology and Canonic Law (Vargas Martínez, 1991). Since 1778, Duquesne served for fifteen years as the parish priest of the village of Lenguazaque. After this period, he was transferred to another village named Gachancipá, where he remained until the year 1800 when he received an appointment at the cathedral of Santa Fé de Bogotá as a overseer of the Catholic Church's affairs in the city in the early years of the Colombian Republic, office he held until the year of his death, 1821.

As a product of his years of interaction with the indian communities of Len-

Figure 3.1: José Domingo Duquesne. Engraving of Antonio Rodriguez (1882).

guazaque and Gachancipá, descendants of the ancient Muisca, Duquesne was profoundly interested in this culture, its history, language and especially, its calendar, which details he knew presumedly from indigenous sources. According to a version accounted by some relatives of Duquesne to the author Liborio Zerda, his curiosity about the native antiquities, added to the kindness of priest with the native community, gained the sympathy of the indians, who frequently brought him archaeological objects, which he studied with a lot of interest. Duquesne was then offered to be taken in secret to a hidden cave containing ancient objects, kept under the indians' care since old times. Duquesne was also demanded by an indian elder to keep the secret of the existence of that place. Once there, the indians explained Duquesne the meaning of some objects and probably, the calendar (Zerda, 1882, p.243)[1].

In 1795 Duquesne addressed (and dedicated) to José Celestino Mutis, general

[1]It is unknown so far in what of the two villages served by Duquesne could happened this episode.

chief of the *Real Expedición Botánica*, a paper which title translates into: *Dissertation on the calendar of the Muyscas, natural Indians of this New Kingdom of Granada, dedicated to the Doctor José Celestino Mutis, chief of the Botanical Expedition. By Doctor José Domingo Duquesne de la Madrid, priest of the church of Gachancipá of the same Indians, year of 1795.*[2] This text was compiled by Colonel Joaquín Acosta as an appendix of his *"Compendio Histórico del descubrimiento y colonización de la Nueva Granada"*, published in 1848. Afterwards, towards the end of the nineteen century, Liborio Zerda (1882), published a series of articles in the *Papel Periódico Ilustrado* magazine, titled *"El Dorado"*[3], and showcases another Duquesne's texts on the same subject, titled *"Dissertation on the origin from the calendar and hieroglyphs of the Moscas"*, *"The Astronomical Ring of the Moscas"*, *"Explanation of the Symbols of the Century or Calendar of the Muiscas"*, *"Table of the Muisca's years"*.[4] These manuscripts apparently were owned by a certain Alberto Quijano (Zerda, 1882); like the previous paper, it is also dated to 1795. As a methodological convention, along this work I will refer to *Dissertation* as the text published by Acosta, and to the *Astronomical Ring* as the set of writings published by Zerda[5].

At first glance, both the *Dissertation* and the *Astronomical Ring* seems to be the same text, but a closer look reveals important differences. It is possible that the *Astronomical Ring* was a preliminary draft to the final *Dissertation* sent to Mutis. This fact was noted by Zerda, who argued that the *Dissertation* is just a summary of the results described in detail in the *Astronomical Ring*:

> ...he limited himself to to present only the summary of his manuscripts

[2] *"Disertación sobre el calendario de los muyscas, indios naturales de este nuevo Reino de Granada, dedicada al Señor Doctor José Celestino Mutis, director general de la Expedición Botánica. Por el Doctor José Domingo Duquesne de la Madrid, cura de la iglesia de Gachancipá de los mismos indios, año de 1795"*

[3] Which will be published posteriorly as a book with the same name.

[4] *"Disertación sobre el origen del calendario"* y *"Jeroglíficos de los moscas"*, *"Anillo astronómico de los moscas"*, *"Explicación de los símbolos del siglo o calendario de los moscas"*, *"Tabla de los años muiscas"*

[5] In the Appendix A of the present work is included a transcription of the whole work of Father Duquesne (*Dissertation* and *Astronomical Ring*) in its original version in spanish.

> to Mr. Mutis, director of the Botanical Expedition of the Viceroyalty; this summary was published by Colonel Acosta... prior to this memoir or dissertation, he wrote other texts that we also have in hand, which were his first writings on this topic and served as base to write the memoir that he addressed to Mr. Mutis, and in which he improved upon the interpretation of the Muisca Calendar.[6].

Nevertheless, this difference is not too emphasized by 19th and 20th century researchers, as the *Astronomical Ring* is the more frequently cited version of Duquesne's works (Restrepo, 1892; Rozo Gauta, 1997).

3.2 Criticisms to Duquesne's work

Although throughout the 19th century Duquesne's model was widely accepted, in 1892 this model suffered a setback when the scholar Vicente Restrepo published a very harsh attack against Duquesne's work entitled *Crítica de los trabajos arqueológicos del Dr. José Domingo Duquesne*, which discredited his thesis, arguing that he *"was swept away by his brilliant imagination"* and concluding that his model was *"an invention of honourable fantasy"*(Restrepo, 1892). The main arguments proposed by Restrepo against Duquesne basically were: (a) The impossibility to find any surviving aspects of Muisca culture in the late 18th century indian communities from the villages where Duquesne served as parish priest. (b) His only valid sources would have been the descriptions and accounts of the Spanish chroniclers, which consequently, would have matched these of Duquesne's, what does not happen. An example of this is his description of the year, which is not found in

[6]"... se limitó unicamente a presentar el resumen de sus manuscritos al Señor Mutis, director de la Expedición Botánica del Virreinato, este resumen fué el publicado por el coronel Acosta... Antes de esta Memoria o disertación, escribió otras que tenemos a la vista, que fueron sus primeros escritos en ésta materia y que le sirvieron de base para confeccionar la Memoria que dirigió al señor Mutis, en la que perfeccionó la interpretación del calendario Muisca..." (Zerda, 1882)

any other chronicler's work, and differs from the well known description by Fray Pedro Simón, and (d) if the indians were his actual informants, Father Duquesne should not have had no reason to hide that fact. All of these arguments shaped the view of mainstream academia, and since then it has been the prevailing opinion of the scholars regarding this topic (Lloreda, 1992).

Nevertheless, in reading Restrepo's analysis, I find it discriminatory, outdated, and hardly acceptable by the standars of modern anthropology. For example, in the first pages of his work, he opens by dismissing the validity of oral tradition:

> "The Spanish conquest ended in the complete subjugation of Muisca Nation. No parts of it remained autonomous in order to retain its language, beliefs and traditions. Everybody, either forced or voluntarily adopted the victor's language and religion (...) When Doctor Duquesne served as parish priest in some indian villages, he just found a poor-ignorant people that could not teach him anything about their ancestors' knowledge (...) the generations that followed two and a half centuries had forgotten everything, even their own language (...) What the illiterated indians from Turmequé, Lenguazaque and Gachancipá could teach him about such convoluted subjects as etymology, astronomy and theogony, which his studies were about?"[7]

This argument is clearly *a priori* and biased. Although Spanish conquest intervened in the culture of native communities, it was not a process of deletion-and-

[7] "...La conquista española terminó con el sometimiento completo de la nación chibcha. Ninguna fracción de ésta logró permanecer en un aislamiento tál que le hubiera permitido conservar su idioma, sus creencias y sus tradiciones. Todos, de grado o por fuerza, adoptaron la lengua y la religión del vencedor (...) Cuando el Doctor Duquesne sirvió como Cura de almas en algunas poblaciones de indios, no encontró en ellas sino pobres gentes ignorantes que nada podían enseñarle de los conocimientos de sus antepasados, (...) Las generaciones que se habrían sucedido en el transcurso de dos siglos y medio habían acabado por olvidarlo todo, hasta su propia lengua (...) ¿Qué podían enseñarle los indios iletrados de Turmequé, Lenguazaque y Gacahancipá, sobre las arduas materias que fueron objeto de sus estudios, y que rozan con la etimología, la astronomía y la teogonía?" (Restrepo, 1892, p.4,6)

replacement as Restrepo alludes. It is worth noting that Muisca communities retained most of their cultural identity through out the colonial period, partly due to the right for communal lands *(resguardos)* granted by the colonial administration, and the recognition of the authority of their *caciques* over these territories (Correa, 2004), allowed the Muisca to maintain most of their social structures, despite the shock that conquest represented. Archaeological evidence also suggest for the the retention of native religious rites until the 18th century (Cárdenas, 1990a,b). In contrast, it seems more plausible that these native communities would have had more to teach to Duquesne than Restrepo imagined.

Restrepo viewed the written record as was the only legitimate foundation for a valid discourse, hence, he argued that Duquesne only had access to *"the printed chronicles available on that time, which were only the works of Bishop Piedrahita, Father Zamora, and Herrera"*[8] and pointed out that the clergyman *"did not have the chance to consult the writings of Jiménez de Quesada, Fray Pedro Simón and other authors, because the library whose manuscripts were kept in, was established in Bogotá years after he did his work"*[9]. Consequently, Restrepo systematically rejected all the details given by Duquesne that were not found in these sources. Restrepo never recognized the opportunity to evaluate the material brought forth by Duquesne as an alternative source of ethnohistorical data, and simply considered dismissed it as incorrect. For example his criticism of Alexander von Humboldt's commentary on the ceremonial processions performed by the Muisca during the *Guesa*'s sacrifice (Humboldt, 1878) , which is directly based on Duquesne's work (see Appendix A). Restrepo argues:

...no chronicler says that the Chibcha knew about the gnomonic obser-

[8]"...las crónicas que corrían entonces impresas, que se reducían a las obras del Obispo Piedrahita, del Padre Zamora y de Herrera"(Restrepo, 1892, p.5)

[9]"Ni tuvo (Duquesne) siquiera ocasión de consultar los escritos de Jiménez de Quesada, de Fray Pedro Simón y de otros autores, que se conservaban manuscritos en la Biblioteca, porque no se estableció en Bogotá sino años después de haber dado cima a sus trabajos."(Restrepo, 1892, p.5)

> vations, represented Bochica with three heads, or confused him with the Sun, who was the Chía's husband, the Moon, or that they weared masks in their processions imitating frogs and customs resembling the monstrous Tomagata (...) This is the way history becomes distorted![10]

Using similar arguments, Restrepo dismisses the Duquesne's description of the calendar, since it is not a simple verbatim copy of the Simón's chronicle.

However, certain details have been confirmed by later ethnohistorical discoveries, as the trial of Cacique Ubaque in 1564 (Casilimas and Londoño, 2001; Londoño, 2001) (see chapter 4), and recent studies confirm the association Bachue-Sun (Correa, 2004). Furthermore, section 3.3.13 I will show how both Simón and Duquesne's descriptions of the calendar are not in conflict, rather they validate and support each other instead.

Other criticisms to Duquesne's work involves his lack to properly mention his sources. However, the ethnographic origin of his data seems very plausible. As Liborio Zerda indicates: *without the frequent and intimate relationships and communications with the indians, it cannot be understood how Duquesne could interpret the Muisca calendar and collect so much and interesting data.*[11]. Restrepo argued that if Duquesne really obtained his information from the indians, there would be no reason to keep it quiet. I think that, on the contrary, he effectively did. Considering the probable circumstances under which Duquesne was introduced to the traditional knowledge of the Muisca (see previous section), his permissive attitude of tolerating the indian 'pagan tradition' would have caused him serious problems at the risk of

[10]"...ningún cronista da cuenta de que los Chibchas conocieran las observaciones gnomónicas; ni de que representaran á Bochica con tres cabezas; ni que confundieran á éste con el Sol, que era el esposo de Chía, la Luna; ni de que llevaran en las procesiones caretas imitando ranas y disfraces que recordaran al monstruoso Tomagata (...) ¡Así es como se desfigura la historia!"(Restrepo, 1892, p.7-8)

[11]"Sin las relaciones íntimas y frecuentes comunicaciones con los indios, no se puede comprender como Duquesne hubiera podido interpretar el calendario de los muiscas, y recoger tantos y tan interesantes datos."(Zerda, 1882, p.242)

losing his sacerdotal career. Throughout three centuries of colonianlism, the usual reaction of catholic priests towards slightest evidence of native religious practices was punishment and confiscation of native religious paraphernalia, especially if such paraphernalia was made of gold. Clearly, Duquesne was an unusual case for that time and consequently, he must have maintained a prudent silence about his relationship with the indians at the risk of his career. This could explain why the clergyman avoided revealing his close relationship with the people he studied, which was only vaguely expressed in this paragraph from the *Astronomical Ring* (the *italics* is mine):

> "... I guess that the scholar that would take the work to combine into one idea the remaining historial news of this nation, and *if in any case has treated the indians with some frequency (and not superficially), and has penetrated their mood and their misterious and emphatic character*, will know the soundness of the foundations over I will establish this interpretation."[12]

The criticisms of Restrepo are, thus, founded on outdated academic views and biases against the Indians. However some flaws can be detected in Duquesne's description, for example his asumption that three solar years exactly equals 37 lunar months (see sections 3.3.9 and 3.3.12), these are not a solid premise upon which to reject the entirely of the work and declare it the product of a madman, as proposed by the Restrepo's argument.

It seems likely that Duquesne's description is merely an incomplete snapshot, derived from surviving vestiges of Muisca traditions during the 18th century. The aim of future research should be to compile a more complete picture of the Muisca

[12]"Bien que, creo que el lector erudito que se tome el trabajo de combinar bajo una idea las noticias históricas que nos han quedado de esta nación, si por otra parte ha tratado con alguna frecuencia (y no superficialmente) a los indios; si ha penetrado su genio y su carácter misterioso y enfático, conocerá la solidez de los fundamentos sobre que establecemos esta interpretación."(Zerda, 1882)

Calendar System. The remainder of this chapter will introduce Duquesne's model of the Muisca Calendar, and will further demonstrate how new structures of this system arise from the deductive analysis of both Duquesne's work and ethnohistorical sources.

3.3 Duquesne's model

3.3.1 Work's structure

The fact that the texts of the clergyman are obscure does not diminish their importance. Duquesne's work deserves a closer look than the one previously accorded him by scholars like Restrepo. When the *Astronomical Ring* and the *Dissertation* are read simultaneously, one notices that they provide complementary information, contributing to a greater understanding of their meaning. Although both texts share identical paragraphs, the *Dissertation* tends to show a more compact writing, which could have lead Zerda to consider it just a summary, though he may not be right at all. Indeed, the *Dissertation* might be considered as a more polished text derived from the *Astronomical Ring*.

Both the *Astronomical Ring* and the *Dissertation*, show the same thematic structure:

1. They begin with a commentary on the manners the ancient people had in making their calendars according to the Sun and the Moon, and argues that the Muiscas developed similarly.

2. Both described the numerical system, giving a etymological interpretation to the names of the numbers. In this description, one finds one of the more convoluted aspects of Duquesne's thesis: his claim that the Muiscas developed writing and the existence of pictorial signs to represent numbers.

3. The lunar cycle with the denominations for the lunar phases are described. Lunar phases are named using the same terms defined for the numbers.

4. Next, they describe the Acrotom years, defined as a lunisolar system with the intention of fitting both the lunar and the solar movements.

5. They continue describing the rite of the Guesa's sacrifice, showing certain calendrical cycles associated with ceremonies.

6. Then, they provide the description and interpretation of a calendar stone that was given to Duquesne, where supposedly, the exposed cycles are recorded.

7. Finally they describe the *Table of the Muisca years*, a tool apparently designed by the author to find dates in the Muisca chronological system.

A third document that alludes to Duquesne's work is the chapter *Monumentos de los indios muiscas* of the work *"Sitios de las cordilleras de América"* by the famous naturalist Alexander von Humboldt (1878), who met Duquesne during his visit to Santa Fé de Bogotá in 1801. In essence, his chapter is a repetition of the *Dissertation*, extended with a personal analysis of Duquesne's model. He also gives some of Duquesne's opinions on the matter, which are not found in the texts published by Acosta and Zerda.

3.3.2 The Muisca numbering system

This system is fundamental to understand the calendar system proposed by Duquesne. It is based on the use of ten names, or "labels", that represent the values from the number 1 to 10. In order to express the numbers from 11 to 20, these same names are used, but added to them is a *Quihicha* prefix:

> ...they only have names for ten, and once finished, they passed from

> the hands to the feet, adding to each word *quihicha*, that means "foot": *quihicha ata*, the one of foot, or eleven, *quihicha bosa*, twelve, etc. (p. 210)

Duquesne provides a table with the number names, which, by means of *quihicha* will express the values from 1 to 20:

(1)	Ata	(11)	Quihicha Ata
(2)	Bosa	(12)	Quihicha Bosa
(3)	Mica	(13)	Quihicha Mica
(4)	Muihica	(14)	Quihicha Muihica
(5)	Hisca	(15)	Quihicha Hisca
(6)	Ta	(16)	Quihicha Ta
(7)	Cuhupcua	(17)	Quihicha Cuhupcua
(8)	Suhusa	(18)	Quihicha Suhusa
(9)	Aca	(19)	Quihicha Aca
(10)	Ubchihica	(20)	Quihicha Ubchihica

Note that the term for twenty, *Quihicha Ubchihica*, has the same meaning as the prefix *Gueta*, which is used to denominate a group of twenty. Added to the previous names, it serves to express any amount. The priest Fray Fernando de Lugo wrote in 1619 a detailed description of the Muisca's system of numeration in his *Gramática en la Lengua General del Nuevo Reyno, llamada Mosca*. Pioneering the concept of the modern phonetic alphabet used by linguists, Father de Lugo designed some typographical signs in order to match as much as possible the original Muisca phonetics (see figure 3.2), which are in essence, the same terms given by Duquesne, two centuries later, in the 18th century.

About the use of the term *Quihicha Ubchihica* (20) both authors agree that alternatively the word *gueta* can be used, which apparently was more appropriate to express twenty and other derived amounts. Furthermore, Father Lugo explains in more detail the correct grammatical formation of numerical expressions:

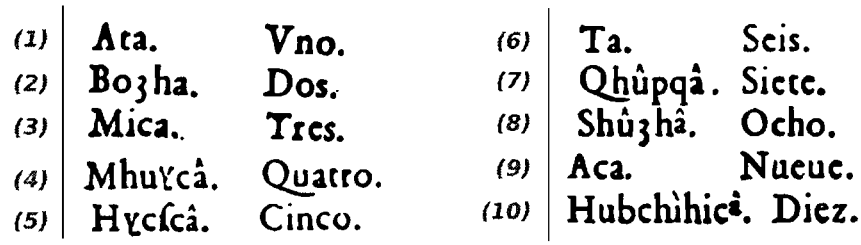


Figure 3.2: Facsimile of Fray Fernando de Lugo's description of the Musica numbers (1619).

> ...and to count twenty one, we put between the term gueta and the term ata the particle "asaqɣ", that means 'and more', and for proper pronunciation and sound after the term gueta, we add the letter S... [13]

He gives the dictions for the numbers from 21 to 40:

(21)	Guetas asaqɣ ata	(31)	Guetas asaqɣ qhicha ata
(22)	Guetas asaqɣ boʒha	(32)	Guetas asaqɣ qhicha boʒha
(23)	Guetas asaqɣ mica	(33)	Guetas asaqɣ qhicha mica
(24)	Guetas asaqɣ mhuɣcâ	(34)	Guetas asaqɣ qhicha mhuɣcâ
(25)	Guetas asaqɣ hɣcscâ	(35)	Guetas asaqɣ qhicha hɣcscâ
(26)	Guetas asaqɣ ta	(36)	Guetas asaqɣ qhicha ta
(27)	Guetas asaqɣ qhûpqâ	(37)	Guetas asaqɣ qhicha qhûpqâ
(28)	Guetas asaqɣ shûʒhâ	(38)	Guetas asaqɣ qhicha shûʒhâ
(29)	Guetas asaqɣ aca	(39)	Guetas asaqɣ qhicha aca
(30)	Guetas asaqɣ hubchìhicâ	(40)	Guetas asaqɣ qhicha hubchìhicâ

The value 40 can be replaced by the term *gueboʒha*, that is, two twenties; therefore, (41) *gueboʒha asaqɣ ata*, (42) *gueboʒha asaqɣ boʒha*, and so on. Note that this notation indicates a cognitive base 20 plan of numbering: in order to express any value it is necessary to group it in amounts of twenties.

[13]"...Y para contar veynte y uno, pondremos entre este termino gueta, y el termino ata esta partícula asaqɣ, que quiere dezir y mas, y para la buena pronunciación y sonido después del termino gueta, añadiremos esta letra S"...(de Lugo, 1619, p110).

In order to understand Duquesne's writings, it is necesary to take into account that in situations where he is speaking about amounts higher than ten, he only used the basic name for the values from 1 to 10, as he was not diligently using the appropiate prefixes, a fact that could cause confusion and consequently, lead to a misunderstanding of his work.

3.3.3 Muisca 'written ciphers': a hypothetical reinterpretation

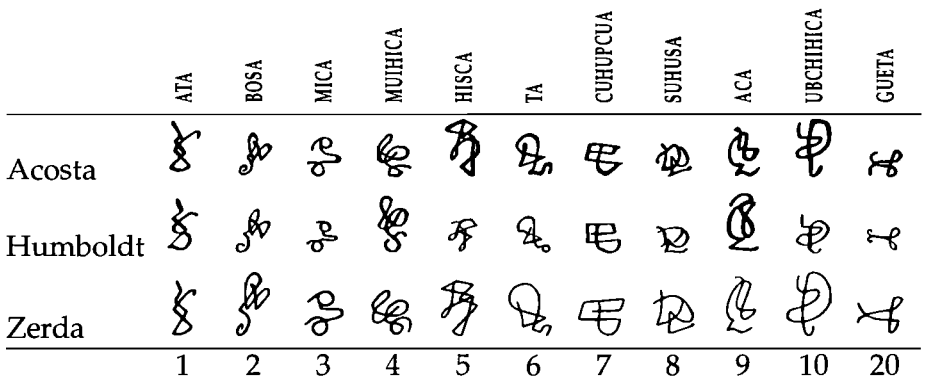


Figure 3.3: Muisca 'written ciphers' according Duquesne. The version of the symbols as published by Acosta (1848), Humboldt (1878) and Zerda (1882) are shown

In his description of the Muisca numbers, father Duquesne says that they used written signs to denote them, and gives a plate showing the graphic symbols for each name and number. Figure 3.3 shows such 'ciphers', as they were published by Acosta (1848), Zerda (1882) and Humboldt (1878), and the slight differences between them can be explained by the style of the different artists who prepared the plates for printing. Seeing them together helps us get an idea of the symbols in the original Duquesne manuscript.

A problem with these graphic symbols is that they are practically nonexistent in any of the material expressions of this culture, for example pottery, textile, rock art, gold and stone artifact decoration. Also, several chroniclers emphatically af-

firm that the Muiscas lacked a writing system(de Lugo, 1619; Simón, 1625). These facts have been used as critical arguments against Duquene's credibility (Restrepo, 1892).

Nevertheless, to state that such 'cyphers' are just an invention of the clergyman is just an easy way out, so I consider it plausible that such symbols were given to the clergyman by his indigenous informants. However, considering that the numerical quantities represented in some some archaeological artifacts of this culture (i.e. the Choachi stone, see section 5.2) the Muiscas may have opted for a graphically simpler way to represent numbers than the intricate *graffitis* given by Duquesne. How can be explained such symbols? What did the indigenous informant mean when he drew such symbols for the inquiring priest? Perhaps the priest understood as cyphers some graphic symbols that represented a different thing than numbers, but related to them in some way.

From analyzing Duquesne's interpretation about the meaning of the etymology of the names of number, we came to a possible interpretation. Table 3.1 shows a summary of such an analysis. Those definitions were received with distrust by other scholars, who considered them vague and without sense in the context of numbering: *"...but it is not possible to admit that when the ignorant man feels the basic need to count, he would name four to a black thing (muyhica), six to the sowing (ta) and twenty to the home (gueta)"* (Humboldt, 1878). Such apparent lack of sense could be conciliated if those descriptions were not seen as *meanings for numbers*, but as *descriptions of celestial asterisms* instead, which at the same time could have with the same names as the numbers. In this alternative context, it is more convincing to speak about shapes that resembles toads, human face features, and agricultural tools. Note also that some remarkable 'black things' in the sky are dark zones of the Milky Way, as seen in the southern hemisphere, which were considered asterisms by Native American cultures of the Andes (Urton, 1981a,b).

Number name		Duquesne's description and/or etymologies
1	*Ata*	A toad in the act of jumping, which characterizes the start of the year.
2	*Bosa*	The nose and the nostrils.
3	*Mica*	Two opened eyes and the nose. To look for, to find, to choose small things.
4	*Muihica*	Two closed eyes. Home stone, black thing, to grow.
5	*Hisca*	Union of two figures: fecundity symbol. Green thing. Happiness, to lie one over another, medicine, to enjoy.
6	*Ta*	The stick and the cord: with it they formed the circle of their houses and their sowing fields. Sowing, harvest.
7	*Cuhupcua*	The two ears covered. Deaf person. The figure of a snail or an ear.
8	*Suhusa*	The stick and the cord. Tail. Do not pull of another thing. To spread.
9	*Aca*	A toad from which tail begins to form another toad. The goods.
10	*Ubchihica*	Ear, it means the moon phases. Shining moon, painted house, to paint.
20	*Gueta*	A lying or stretched toad . House and sowing field, to touch.

Table 3.1: Duquesne's description and etymologies of the Muisca numbers.

Although this interpretation is not directly argued by Duquesne, his commentary about the possible constellations the Muiscas valued suggests it. In it he associates the name for one *(Ata)* to the Pisces constellation and the name of five *(Hisca)* to Gemini. Additionally, he provides information about an asterism dedicated to the Cacique Tomagata, a monstrous mythical personage that had only an eye, four ears and a long tail, which Duquesne supposes is the memory of an ancient sighting of a comet:

> ...his name Tomagata, means fire that burns. [The Muisca] located in the astrological sky this horrifying comet, and I, according to the circumstances of his story, guessed that they will classify him rather as eunuch of the Gleaner Virgin than as Sagittarius' partner[14].

[14]"...Su nombre Tomagata, significa fuego que hierve. Ellos pasaron al cielo astrológico este

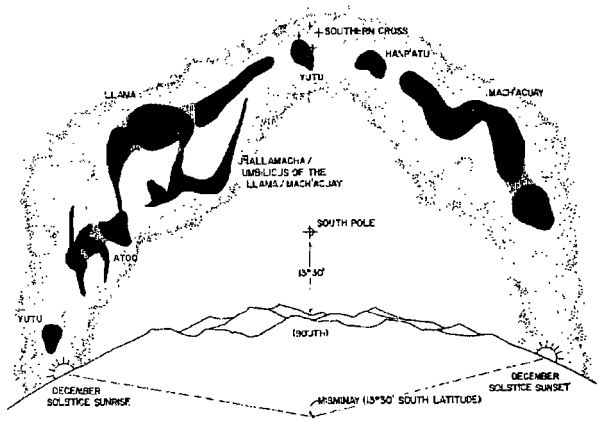


Figure 3.4: Dark zones of the Milky Way, seen as constellations by current Andean communities. (Urton, 1981b, p.171)

Which probably relates to the sky area occupied by the western Scorpius constellation. The association of the name of the numbers 6 *(Ta)* and 8 *(Suhusa)* as a stick and a cord used to trace circles, strongly emphasized by Duquesne as the basis for their 'numbers', could be related to the daily observation of the circular translation of the stars around the sky. At the equatorial latitude of central Colombia, the imaginary stick for such movement would correspond to the geographical north and south cardinal points.

Consequently, an hypothetical explanation for these *graffitis* is to consider that instead of being 'written' ciphers, they are just stylized drawings of celestial asterisms associated to the number names, as seen in the sky by the informer. This could be considered a *serious speculation*, claiming for further ethnohistorical and ethnographical research in the next future.

3.3.4 The Day and the Week

The Muisca considered daylight time and the night as different entities. In his Noticias Historiales, chronicler Fray Pedro Simón (1625) tell us that *"the days were*

espantoso cometa, y yo, según las circunstancias de su historia, creo que le señalarían mas bien por eunuco de la Virgen Espigadora que por compañero de Sagitario..." (see *Dissertation*, p.129)

counted by suns, because it was the cause of them, thus so many suns were so many days; these were divided in three parts, morning, noon, and afternoon"[15]. According Duquesne, "*...the artificial day was called* sua, *that is, a sun measured from dawn to sunset*", the daylight span apparently was divided in two parts, one from dawn until noon and another from the noon to sunset. Duquesne gives the terms *suamena* and *suameca* for these spans, which is agreed by Ezequiel Uricoechea's grammar and vocabulary (Uricoechea, 1871), however, the 17th century *Diccionario y gramática Chibcha* by anonymous author, indicates that these terms are synonyms for the 'afternoon' span, giving for the 'morning' the alternative term *Zacoca* (González, 1987). All the sources agree that the word for 'night' entity was *Za*, and similarly to the day, it was divided in two: *Zasca* corresponded to the span from sundown to midnight and *Cagüi*, from midninght to dawn. *Cagüi*, also means 'morning star' González (1987), which possibly relates such part of the day with the sighting of bright planets, especially Venus, during the early morning.

Apparently, the Muisca lacked of a concept of week, at least as we understand it. The descriptions provided by different chorniclers are different, for example in the *Epítome de la conquista del Nuevo Reino de Granada* the Adelantado Gonzalo Jiménez de Quezada is described

> ...They have distributed the times of months and years in a very convenient way. The first ten days of the month, they eat an herb known in the sea coast as hayo, that supports and purges them their unwellness. After these days, cleaned of the hayo, they work another ten days in their sows and lands. And the another remaining ten days of the month, are spent in their homes, talking and resting with their women.[16]

[15]"...los días contaban por soles, viendo que él era la causa de allos, de manera que tantos soles eran tantos días; estos distinguían en sólo tres partes, mañana, medio y tarde..."(Simón, 1625, p306)

[16]"...tienen repartidos los tiempos de meses y año, mui al propósito: los diez días primeros del

According this, the 30 day-month would be divided in three 'weeks' of ten days each. Simón, however, gave us a different version of the week:

> They counted the months by moons with its wanings and crescents, dividing each one of these in another two, such that they were four parts of the month or moon, in the same manner we divide it by four weeks.[17]

The situation is even confuse when in his work, Duquesne affirms that *"the week was of three days, and it is known about its use because each three days they used to make in Turmequé, place belonging to Guatavita, a market."*[18]. It can be considered that such different versions are product to the intention to match the european idea of the week to the diverse times associated to rutinary activities of society, which certainly were not regulated by a standarized timespan between day and month. The *Diccionario y gramática Chibcha,* gives us some clues in this direction in its entries for sentences as *Fasinga domingoca*: 'the next Sunday' , *Miércolesca hunga*: 'The Wednesday he will come' , *Viernesc inanga*: 'I will go this friday', where the Muisca translations for the names of days of the week appeal to the corresponding spanish words (Domingo, Miércoles, Viernes) integrated into the native grammar, as was usual when the described concept was alien to the Muisca language. As it will be discussed in the next sections, the levels of resolution of the Muisca timekeeping system can be considered as days, months, years and centuries.

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mes, comen una yerba que en la costa de la mar llaman hayo, que los sustenta mucho y les hace purgar sus yndisposiciones. Al cabo de estos días, limpios ya del hayo, tratan otros días en sus labranzas y haciendas, y los otros diez que quedan del mes, los gastan en sus casas, en conversar con sus mujeres y en holgarse con ellas" (de Benavides, 2001)

[17]"...los meses contaban por lunas con sus menguantes y crecientes, dividiendo cada una de éstas dos en otras dos, con que venían hacer cuatro partes del mes, ó la luna al modo que nosotros lo dividimos por cuatro semanas... (Simón, 1625, p306)"

[18]La semana era de tres días, y se conoce que usaban de ella porque cada tres días hacían en Turmequé, lugar perteneciente al Guatavita, un mercado.

3.3.5 The Lunar Cycle

As already been said, both the *Astronomical Ring* and the *Dissertation* discuss the arrangement of the lunar cycle as a set of formulas designed to find the time corresponding to the lunar phases. These formulas are based on counts of days done with the fingers. We read in the *Astronomical Ring*:

> ... The signs that have human shapes represent the different aspects of the moon, that successively vary in each month. *Mica* and *Muihica* appear on the syzygies; *Mica*, in the open eyes, the full moon and the opposition; *Muihica* in the closed eyes, the conjunction or new Moon. *Bosa* and *Cuhupcua*, the first phases of the Moon, and *Ubchihica* the quadratures...
>
> ...*Cuhupcua* is the neomemia[19]... this is one a common and universally well-known first phase; as the new moon is brief in some months and in others is more delayed, it was designated as the fourth day so that there were differences, unless we want *Bosa* representing the neonemia of the brief months and *Cuhupcua* the others. Counting from *Muihica* they found the number 7 the first quadrature, in *Ubchihica* after the neonemia; and counting from *Mica* they found in the number 8 the second one after the opposition, on the same sign... Finally, *Bosa* gave them the last phase of the moon placed in the third finger before *Muihica*[20].

[19]The time of the new moon.

[20]"...Los signos que tienen facciones humanas representan los diferentes aspectos de la luna, que sucesivamente se varían en cada mes.
Mica y *Muihica* figuran las dos Zisigias; *Mica*, en los ojos abiertos, el plenilunio y la oposición; *Muihica* en los ojos cerrados, la conjunción o girante.
Bosa y *Cuhupcua*, las primeras fases de la luna, y *Ubchihica* las cuadraturas...
(...) *Cuhupcua* es la neonemia... es una primera fase vulgar y universalmente conocida; y como el novilunio en unos meses es más breve, en otros más tardío, se colocó en el día cuarto para que hubiese diferencia, a no ser que queramos que *Bosa* represente la neonemia de los unos y *Cuhupcua* la de los otros.
Contando desde *Muihica* hallaban al número 7 la primera cuadratura, en *Ubchihica* después de la neonemia ; y contando desde *Mica* encontraban al número 8 la segunda después de la oposición,

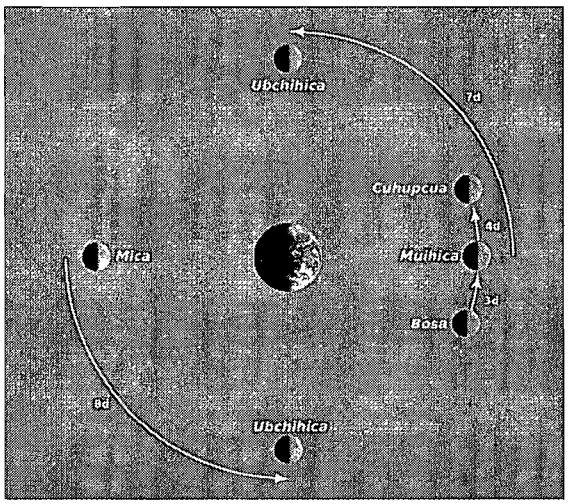

Figure 3.5: Lunar phases according the *Astronomical Ring*

The *Astronomical Ring* does not clearly to explain why, in order to determine moments in time, names of numbers are thus used. An apparent argument should be the etymological relations of the names of numbers and the shape of their lunar phases. Thus, it could be supposed that the names are used as descriptive labels for the moments of the lunar cycle. In figure 3.5, we can appreciate a scheme of the lunar orbit where these names are located according to the position of the satellite around the Earth. We see that *Ubchihica* corresponds to the quadratures (waxing and waning), *Mica* marks the Full Moon, *Muihica* the New Moon, *Bosa* and *Cuhupcua* the heliacal rising and settings (neonemies) of our satellite.

It is however, surprising to find a radically different description in the *Dissertation*:

> ...they commenced to count the month from the opposition or full-moon in the sign of *Ubchihica*, which signified brilliant moon: counting seven days on the fingers, beginning at *Ata*, which follows *Ubchihica*, they found the quadranture in *Cuhupcua*; counting from this, seven,

en el mismo signo...
Finalmente *Bosa* les daba la última fase de la luna colocada al tercer dedo antes de *Muihica*". (Duquesne, 1882, p216)

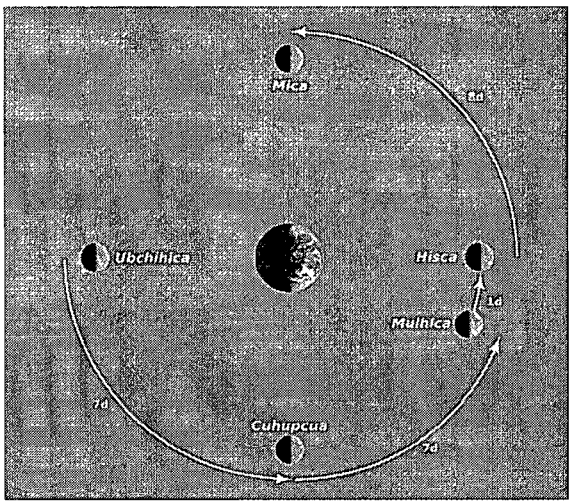

Figure 3.6: Lunar phases according the *Dissertation*

> they found the next immersion of the Moon in *Muyhica*, which meant anything black; and the next day, the conjunction symbolized in *Hisca*, (...), then counting eight days, they found the other quadrature in *Mica*, which meant a changing object, (...), The first aspect of the first phase was in *Cuhupcua*, and as this symbol fell during the quadrature, they gave it two ears, calling it deaf for reasons of superstition...[21]

How come Duquesne contradicts himself as much as he does in his two texts? Can it be attributed to transcription error by Acosta or Zerda? It does not seem possible; both authors are emphatic in their desire to publish faithfully Duquesne's writings, aiming to contribute to future research. Perhaps the *Astronomical Ring* is imprecise, it being a rough draft. At at first glance it could give this impression. Nevertheless, a detailed analysis reveals that indeed both texts are congruent and

[21] "...comenzaban á contar el mes desde la oposición, ó plenilunio figurado en *Ubchihica*, que significa luna brillante; contando siete dias en los dedos comenzando por *Ata*, que se sigue á *Ubchihica*, hallaban la cuadratura en *Cuhupcua*; contando de allí siete encontraban la próxima inmersión de la luna en *Muyhica*, que significa cosa negra, y al dia siguiente la conjunción simbolizada en Hisca, (...), contando después ocho dias hallaban la otra cuadratura en Mica, que significa cosa varia,(...) El primer aspecto de la primera faz la señalan en Cuhupcua, y como en este símbolo caia la cuadratura le daban dos orejas, y le llamaban sordo por otros motivos de superstición". (Duquesne, 1848)

complementary to each other.

Two reasons explain the confusion: first, the assumption made in the *Astronomical Ring* that considers the use of names of numbers as mere labels is erroneous. The *Dissertation* shows that the use of those names really obeys a day-to-day rule, when it explains that the lunar month begins "*...by Ata*, which follows *Ubchihica...*", that is, a day numbered as 1 (*Ata*), follows after another one numbered as 10 (*Ubchihica*). Consequently, if such a name is really pointing to the ending day of the previous lunar cycle, it would be referring not to the 10, but to the number 30, which is expressed as '*Guetas asaqγ* ubchihica'. The lack of care that Duquesne gives to the rigorous use of prefixes for the amounts greater than ten, results in the second cause of confusion, leading him to put a same number name to different moments of the lunar cycle. The dates 5, 15, and 25 of a certain month, for example, are simply referred to as days whose name is "Five".

Let us check again the texts, step by step, to locate the given symbols in a sequence of thirty days. Let us begin by the *Dissertation*:

- "*...they commenced to count the month from the opposition or full-moon in the sign of Ubchihica*". As mentioned already, it apparently assigns the beginning of the count to the last day of the previous cycle, [Guetas asaqγ] Ubchihica (30).

- "*...counting seven days on the fingers, beginning at Ata, which follows Ubchihica, they found the quadranture in Cuhupcua*" Here it is clear that it is a wheel of 30 days, where *Ata* (1) follows *[Gueta asaqγ] Ubchihica* (30). Obviously, *Cuhupcua* is the seventh day of the cycle. However, a peculiar and important detail must be noted: in the case of the *Dissertation*, Duquesne always uses *the next day* to mean the day taken as origin. In this case, the origin is *[Gueta asaqγ] Ubchihica*, but he counts from the next day, Ata.

- "*...counting from this, seven, they found the next immersion of the Moon in Muy-*

hica" That is, counting from the seventh day *(Cuhupcua)* there would be the heliacal lunar set at the 14 day, which is *[Quihicha] Muyhica.*

- *"...and the next day, the conjunction symbolized in Hisca"* that is, the 15 day, *[Quihicha] Hisca.*

- *"...then counting eight days, they found the other quadrature in Mica"* that is, the 23 day, *[Guetas asaqχ] Mica.*

- *"...The first aspect of the first phase was in Cuhupcua, and as this symbol fell during the quadrature, they gave it two ears, calling it deaf for reasons of superstition..."* This *Cuhupcua* refers to the 27 day , *[Guetas asaqy] Cuhupcua.* Here the text is a bit confusing when it mentions a quadrature in a moment corresponding to a full Moon; Duquesne actually refers to the 7 day, (Cuhupcua), which etymologically matches the date of the full Moon.

Let us now examine the *Astronomical Ring.* It is important to notice that in this case, unlike in the *Dissertation,* Duquesne now counts from the origin number. It is not clear why Duquesne did so in this case.

- *"...Mica and Muihica appear on the syzygies; Mica, in the open eyes, the full moon and the opposition; Muihica in the closed eyes, the conjunction or new Moon."* That is, the 3rd day, *Mica,* and the 14th day *[Quihicha] Muihica.*

- *"...Bosa and Cuhupcua, the first phases of the Moon (...) Cuhupcua is the neonemia (...) is a common and universally well-known first phase; as the new moon is brief in some months, and in others is more delayed, it was designated as the fourth day so that there were difference, unless we want Bosa representing the neonemia of the brief months and Cuhupcua the one of the others (...) Finally, Bosa gave them the last phase of the Moon placed in the third finger before Muihica"* It refers to the 12th day, *[Quihicha] Bosa,* and the 17th day, *[Quihicha] Cuhupcua.* The day

[Quihicha] Bosa points to the heliacal lunar setting, according Duquesne occuring three days before the conjunction, whereas *[Quihicha] Cuhupcua* gives the heliacal lunar rise, four days after the conjunction, which he places on the 14th day, *[Quihicha] Muihica*.

- *"...Counting from Muihica they found in the number 7 the first quadrature, in Ubchihica after the neonemia"* It refers to the 14th day, *[Quihicha] Muihica*, the supposed new moon, and from it they counted seven days, arriving to the 20th day, *[Quihicha] Ubchihica*. It is peculiar that Duquesne describes this quadrature as the first one, leading one to think that the month started in the new moon. However, in the *Dissertation*, the quadratures are described in an inverse order, and despite of this it is not said which one is the first or the second. In that version, it is implicit that the month began during the full moon.

- *"and counting from Mica they found in the number 8 the second one in same sign, after the opposition..."* From the 3th day, *Mica*, they counted eight days in order to arrive to the 10th day, *Ubchihica*, that Du quesne would designate as "the second" conjunction.

Let us place in a table the data provided by Duquesne, in order to compare both versions more easily. A table of thirty rows can be used, each one assigned to a day in the sequence from 1 to 30:

For ease of comparison, let us display Duquesne's data in a table. Each of the thirty rows in table 3.2 represents one day in a sequence from 1 to 30.

Table 3.2: Comparison between the lunar cycle times according to the *Dissertation* and the *Astronomical Ring*.

#Day	Prefix	Name	Dissertation	Astronomical Ring
30	Guetas asaqץ	Ubchihica	Opposition: *"...they commenced to count the month from the opposition or full-moon in the sign of Ubchihica..."*	
1	—	Ata	*"...beginning at Ata, which follows Ubchihica..."*	
2	—	Bosa´		
3	—	Mica		Opposition: *"...Mica and Muihica appear on the syzygies; Mica, in the open eyes, the full moon and the opposition; Muihica in the closed eyes, the conjunction or new Moon...."*
4	—	Muihica		
5	—	Hisca		
6	—	Ta		

#Day	Prefix	Name	Dissertation	Astronomical Ring
7	—	Cuhupcua	Quadrature: *"...counting seven days on the fingers, beginning at Ata, which follows Ubchihica, they found the quadranture in Cuhupcua..."*	
8	—	Suhusa		
9	—	Aca		
10	—	Ubchihica		Quadrature: *"...and counting from Mica (3) they found in the number 8 the second one in same sign, after the opposition..."*
11	Quihicha	Ata		
12	Quihicha	Bosa		Heliacal lunar set: *"...representing (Bosa) the neonemia of the brief months (...) Finally, Bosa gave them the last phase of the Moon placed in the third finger before Muihica..."*
13	Quihicha	Mica		

#Day	Prefix	Name	Dissertation	Astronomical Ring
14	Quihicha	Muihica	Heliacal lunar set: *"...counting from this (Cuhupcua [7]), seven, they found the next immersion of the Moon in Muyhica..."*	Conjunction: *"...Mica and Muihica appear on the syzygies; (...) Muihica in the closed eyes, the conjunction or new Moon..."*
15	Quihicha	Hisca	Conjunction: *"...and the next day, the conjunction symbolized in Hisca..."*	
16	Quihicha	Ta		
17	Quihicha	Cuhupcua		Heliacal lunar set: *"...Cuhupcua is the neonemia* [that is] *the one of the others* [brief months]..."
18	Quihicha	Suhusa		
19	Quihicha	Aca		
20	Quihicha	Ubchihica		Quadrature: *"...Counting from Muihica they found in the number 7 the first quadrature, in Ubchihica after the neonemia..."*
21	Guetas asaqץ	Ata		
22	Guetas asaqץ	Bosa		

#Day	Prefix	Name	Dissertation	Astronomical Ring
23	Guetas asaqץ	Mica	Cuadrature: *"...counting eight days* [from hisca (15)], *they found the other quadrature in Mica..."*	
24	Guetas asaqץ	Muihica		
25	Guetas asaqץ	Hisca		
26	Guetas asaqץ	Ta		
27	Guetas asaqץ	Cuhupcua	Full Moon: *"...The first aspect of the first phase was in Cuhupcua..."*	
28	Guetas asaqץ	Suhusa		
29	Guetas asaqץ	Aca		

In contrast to the synodic period of the moon of about 29.5 days, the 30 day account as described by Duquesne suggest that the Muiscas calculated this period using an integer number based arithmetic, as seen in other precolumbian astronomical systems. Ignoring the differences of time in the moon's translation around the Earth in accordance to the Kepler's second law, we can safely approximate:

$$\text{Days between each lunar phase} = \frac{29.5}{4}\text{days} = 7.375\text{days}$$

being 29.5 the timespan of a synodic period of the moon. The times for the waning quarter, new Moon, waxing quarter, and full Moon would be 7.375, 14.75, 22.125 and 29.5 days, respectively (these could be rounded to 7, 15, 22, 30). Thus, the days for each phase, according the two sources can be seen as shown in the table 3.3.

	#Day	#Day (rounded)	Dissertation	Astr. Ring
Quadrature	7.375	7	7	10
Conjunction	14.750	15	15	14
Quadrature	22.125	22	25	20
Opposition	29.500	30	30	3

Table 3.3: Lunar time errors

What is described in both the *Astronomical Ring* as the *Dissertation* does not correspond exactly to the names for the astronomical days of lunar quarters, varying the Dissertation in the day of the waning quadrature, and the *Astronomical Ring* vary by as much as three days before and after astronomical moments, showing an apparent lack of precision.

Nevertheless, when regarding the data in the table 3.2, a somewhat interesting trend arises: The cells occupied by citations in the column of the *Dissertation* appear to complement the empty cells of the column of the *Astronomical Ring* and vice versa. Moreover, considering the information from the two columns as a whole, it becomes evident that each citation is marking the beginning or the end of timespans associated with each lunar quarter. For example, according to the *Dissertation*, the waxing quadrature, occurs on the 7th day, whilst in the *Astronomical Ring* it occurs on the 10th day, covering so in the table a lapse of four cells, from number 7 to 10. From this, the following spans can be deduced from the texts (see table 3.4):

1. Around the opposition (days 27-3) *(the full Moon span)*.
2. Around the waxing quadrature (days 7-10) *(the waning Moon span)*.
3. Around the conjunction, including the heliacal sets and rises (days 12-17) *(the new Moon span)*.
4. Around the waning quadrature (days 20-23) *(the waxing Moon span)*.

Table 3.4: Lunar lapses as deduced from the *Astronomical Ring* and the *Dissertation*

Number	name	Day	Time span
	Ata	1	*the full Moon span*
	Bosa	2	*the full Moon span*
	Mica	3	*the full Moon span*
	Muihica	4	*
	Hisca	5	*
	Ta	6	*
	Cuhupcua	7	*the waning Moon span*
	Suhusa	8	*the waning Moon span*
	Aca	9	*the waning Moon span*
	Ubchihica	10	*the waning Moon span*
Quihicha	Ata	11	*
Quihicha	Bosa	12	*the new Moon span*
Quihicha	Mica	13	*the new Moon span*
Quihicha	Muihica	14	*the new Moon span*
Quihicha	Hisca	15	*the new Moon span*
Quihicha	Ta	16	*the new Moon span*
Quihicha	Cuhupcua	17	*the new Moon span*
Quihicha	Suhusa	18	*
Quihicha	Aca	19	*
Quihicha	Ubchihica	20	*the waxing Moon span*
Guetas asaqץ	Ata	21	*the waxing Moon span*
Guetas asaqץ	Bosa	22	*the waxing Moon span*
Guetas asaqץ	Mica	23	*the waxing Moon span*
Guetas asaqץ	Muihica	24	*

Guetas asaqʏ	Hisca	25	*
Guetas asaqʏ	Ta	26	*
Guetas asaqʏ	Cuhupcua	27	*the full Moon span*
Guetas asaqʏ	Suhusa	28	*the full Moon span*
Guetas asaqʏ	Aca	29	*the full Moon span*
Guetas asaqʏ	Ubchihica	30	*the full Moon span*

Although these spans seem akin to the 'Muisca week' described by Simón (1625), it is unlikely the existence of a concept of week among the Muisca, as discussed in section 3.3.4. Instead, it could be concluded that both the *Dissertation* and the *Astronomical Ring* simply provide pragmatic recipes to allow an observer to establish timespans around the lunar phases, instead of determining the exact date of each quarter, or weeks, as the western traditional system employed by Duquesne to understand the Muisca account of the lunar cycle.

Adjustment of moon cycle duration

Given that the synodic lunar period is about 29.5 (29.530589) days, this would present difficulties to the Muisca, because of their integer-based 30 day month account. It can observed that after two full Moons, a half day difference could accumulate resulting in an error of one day, easily observable. Duquesne did not account for this problem and the eventual adjustment done by the Muiscas. So as a result, we are forced to assume the hypothetical adjustment of one day, leading to the count of thirty days in one month, and twenty nine for the next.

It may be suggested that 17th day of the cycle, *[Quihicha] Cuhupcua*, could be used to perform the adjustment. Located at the end of the period "New moon span", *Cuhupcua* meant "deaf person", which, according to Duquesne, was considered by the Muiscas as propicious to 'ignore' some dates in the context of Muisca

years to make similar adjustements possible[22]. On a monthly level, it would be convenient to include or ignore a *Cuhupcua* day because it would fall in a period when the Moon was not visible.

3.3.6 The Calendar System

This is the most complex part of the Duquesne's work, which unfortunately, has not been fully understood. Albeit the *Dissertation* and the *Astronomical Ring* are virtually identical in this part, Duquesne uses the Muisca number names yet again, this time in the context of accounting lunar months. Similar to the Moon phases, he is not rigurous in the use of the number name prefixes.

According Father Duquesne, the Muiscas had two types of year, both of which were based upon the lunar cycles. The first one was called the *Zocam*, which corresponded to a timespan of twenty moons. The second one, although unnamed by the Muiscas, had a span of 37 moons, and was therefore was given the name *Acrotom Year* by Duquesne .

3.3.7 The Rural year

Although Duquesne did not explicitly mention this kind of year in his work, it can deduced that the Muiscas had an account of twelve moons, a timespan that was pragmatically useful in agricultural activities. In the analysis of the Muisca calendar conducted by alexander von Humboldt this year is referred to as the "Rural year", which is also described by chroniclers as Pedro Simón (1625):

> ...they had also a year of twelve moons or months, that began in January and finished in December, as cleverly than us whom use to start it at such a month, unlike the Roman calendar that began in March. So,

[22]Topic to be covered in the next pages.

> they began it in January, because, being a dry season, they started to farm and prepare the land, in order to cultivate it in the waning moon of March, which is when the first rains of the first wet season of this land begin. And, from January's moon when they began to sow, until December, when they harvested, there was a span of twelve moons, the so called *Chocan*, which means the same we name year, and in order to refer to the previous years, they said *Chocamana*, and for the current year *Chocamata*...[23]

The term *Chocan* is found in the known vocabularies of the Muisca language, translated as "year", without a further explanation about what kind of year is (González, 1987). From Simón it can be deduced that such term is associated to a 12 moon year.

3.3.8 The *Zocam* year

It is worth noting that the term *Zocam*, described by Duquesne, is a variation of the word *Chocan*, however, the Duquesne's *Zocam* refers to a period of twenty moons, which differs to the description of Simón. As a convenion, we will use the term *Zocam* along this work to refer to this twenty moon year, opposed to the 12 moon year, which we will prefer to denominate as 'Rural' year.

Father Duquesne emphasized that the number twenty, base of their numbering system, was of great importance, in both their religious and civil affairs:

[23]"...tenían tambien año de doce meses ó lunas, que comenzaba en Enero y se acababa en Diciembre, pero por la inteligencia que nosotros tenemos para comenzarlo en aquel mes, ni como la que tuvieron los romanos de comenzarlo en el de Marzo; pues sólo lo daban principio desde Enero, porque desde allí a labrar y disponer la tierra por ser tiempo seco y de verano, para que ya estuviesen sembradas la menguantes de la luna de Marzo, que es cuando comienzan las aguas del primer invierno en esta tierra, y como es de la luna de Enero que comenzaban estas sementeras, hasta la del Diciembre, que las acababan de coger, hay doce lunas, a este tiempo llamaban con este vocablo Chocan, que es lo mismo que nosotros llamamos año, y para significar el pasado decían Chocamana, y al año presente Chocamata" (Simón, 1625, p306)

> ...We have said many times that the Moscas considered the number 20 as sacred. So, they must have designed their year around it, if not, they had confused all their accounts (...) everything had to be governed by this number: Gueta was the symbol of happiness, and among this superstitious people, the years that had not been sealed with this character, would have been diminished and laden with misfortune; therefore, among them, the year of twenty moons was mandatory. (...) When they engaged in warfare, they remained in the battlefield for 20 continuous days, singing and being eager for the prospect of victory. If they lost, they still remained on the battlefield for 20 days more, crying and lamenting their misfortune. It is said that Zipa Nemequene and Zaque Michua arraged a solemn truce of 20 moons; and that the mysterious dream of their memorable Bochica lasted in his fantasy twenty times five twenties of years...[24]

Duquesne does not give more details about such a 20 day span, but center the description in the years of twenty moons. The priest refers to them as 'vulgar years', as opposed to the *Acrotom Year* (see next section), and presents the term *Zocam* as the Muisca translation for 'year'. Consequently, the exact meaning of *Zocam/Chocam*, is unknown so far. Only as a convention, however, we will use the term *Zocam* to refer the described 20 moon span along this work.

---

[24] "...Ya hemos dicho muchas veces que los moscas miraban como sagrado el número 20. No podían menos que ajustar por él el año, porque de otra suerte se hubieran confundido en todas sus cuentas (...) todo se debía gobernar por éste número: *Gueta* era símbolo de la felicidad, y entre esta gente supersticiosa hubieran sido menguados e infelices los años que no se hubiesen sellado con este carácter; era, pues inexcusable entre ellos el año de veinte lunas..." (Duquesne, 1882, p217)

"...Cuando denunciaban la guerra asistían por 20 días seguidos en el campo, cantando y alegrandose por la esperanza de la victoria, y si perdían la batalla permanecían en el mismo campo otros 20 días llorando y lamentando su negra y desdichada fortuna. Se dice que el zipa Nemequene y el zaque Michua ajustaron una solemne tregua de 20 lunas; y que el misterioso sueño de su memorable Bochica duró en su fantasía veinte veces cinco veintes de años..." (Duquesne, 1882, p211)

3.3.9 The Acrotom year

Another cycle of moons, was named *Acrotom* year by Duquesne, and was designed by the Muiscas in order to reconcile the differences between the Rural year (lunar year) and the solar annual cycle (solar year), in terms of moons counted in the *Zocam* year. Twelve lunar months have a duration of 354.37 days, therefore, it is out of phase by approximately 10.8 days given the 365.25 day solar year. Duquesne affirmed that the Muiscas discovered that after three lunar years, or 36 moons, they could insert or intercalate an additional month, as defined in their language as "deaf person", that corresponds approximately to the accumulated error, and compensates for it, after three solar years the Sun and the Moon became synchronized:

$$29.530589\text{days} \times (36+1) = 1092.631793\text{days} \quad \sim \quad 365.25\text{days} \times 3 = 1095.75\text{days}$$

Humboldt did not use the term *Acrotom*, instead he preferred to use the term *Sacerdotal* year. He agrees with Duquesne when considering that the calculation of the intercalation was exclusive to the Muisca religious elite, the Xeques and Ojques. Apparently, the knowledge of the Acrotom year was of a *esoteric* nature, in contrast with the Rural and Zocam years, which were publicly known, that is, *exoteric*.

Duquesne described the use of this year as something "hidden" in the Zocam account of 20 moons,

> ... the hidden year of the Moscas will be understood under this assumption, because 20 moons made up a year, in the following one, the 17th moon arrived, they began to sow, according to the month from which they had begun, they intercalated it, in that, they let it pass as useless,

> and they sowed during the following moon that was the 18th...[25]

This gives a series of either $(12 + 12 + 12 + 1)$ or $(20 + 17)$ months[26], the result of which is the same: a timespan of 37 moons.

In the *Dissertation*, Duquesne describes a formula that was based yet again on counting with one's fingers, to determine the times to sow according to the Acrotom year sequence:

> ...they made two continuous sowings with a *sign* between them, and the third one with two signs (...) Let us distribute the Muisca signs among the fingers, and this digital table will give us all the combinations. Let us suppose that *Ata*, which is in the first finger, corresponds to January, and that it is a month suitable to seed. Runned the fingers, it corresponds to the second sowing *Mica*, intercepting to Bosa, which is in the middle of *Ata* and *Mica*, in such a way that this sowing is made in the thirteenth moon, with respect to *Ata*.
>
> Now running the fingers from *Mica*, the sow corresponds to *Hisca*, intercepting to *Muyhica*, which is in the middle of *Mica* and *Hisca*. Such that sowing is made in the thirteenth moon, with respect to *Mica*.
>
> Finally, run the fingers from *Hisca*, and the sowing will be made on *Suhuza*, intercepting two signs: *Ta* and *Cuhupcua*, that are in the middle of *Hisca* and *Suhuza*; this is in the fourteenth moon respect to *Hisca*...[27]

---

[25] "...En este supuesto se entenderá el año oculto de los moscas, porque pasadas las 20 lunas de un año, al siguiente, llegando a la 17a en que les competía sembrar, según el mes por donde habían comenzado, la intercalaban, es decir, la dejaban pasar por inoficiosa, y sembraban en la siguente que era la 18a..." (Duquesne, 1882, p218)

[26] The linguistic origin is clear in $(20 + 17)$: *Guetas asaqγ* (20) + *quihicha cuhupcua* (17) = 37.

[27] "...sembraban dos sementeras seguidas con un *signo* de por medio, y la tercera con dos (...) Distribuyamos pues los signos muyscos en los dedos, y esta tabla digita nos dará todas las combinaciones. Supongamos que *Ata*, que está en el primer dedo, corresponde á enero, y que es un mes apto para sembrar. Corridos los dedos corresponde la segunda sementera en *Mica*, interceptando á *Bosa*, que está en medio de *Ata* y *Mica*. De suerte que esta sementera se hace en la luna

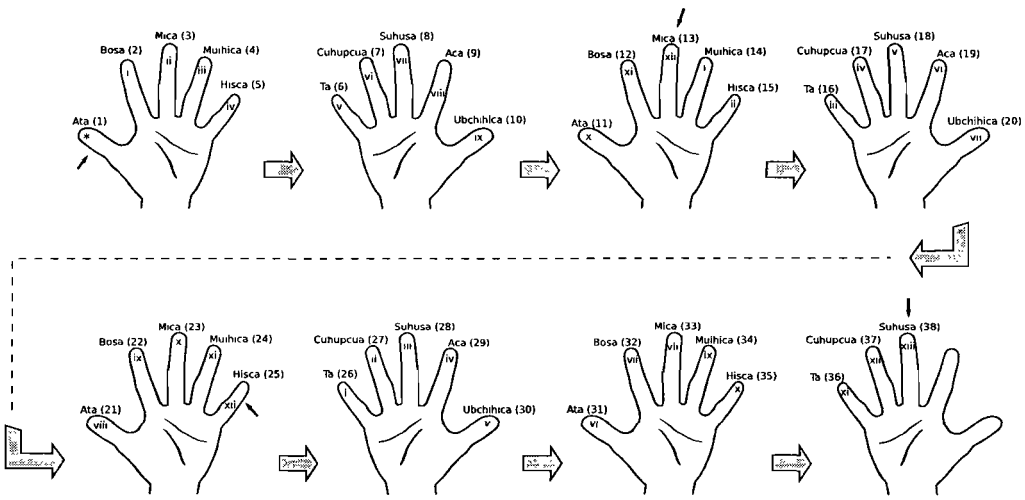

Figure 3.7: Finger accounting to determine the sowings and the intercalary month in the Acrotom year. The tiny arrows mark the signs where sowing have to be made. Note the last finger, whose number is XIII (13)

A careful reading reveals that three intervals of twelve months lunar are being defined, plus an additional month, in order to get thirty seven months. Analyzing now the text in greater depth:

- *"...they made two continuous sowings with a sign between them, and the third one with two signs"*. Here Duquesne is speaking about the operation by which this calculation was made. The figure 3.7 shows how the corresponding number names or, —according to Duquesne— signs, that can be assigned to the fingers, we could therefore assign the value *Ata* to the left thumb, and *Bosa* to the left index finger, counting the fingers until arriving at the right thumb, which would have the value of *Ubchihica*. The idea is to count cyclically on the fingers, returning to the finger marked as *Ata*, whenever the

decimatercia, respecto de *Ata*.

Corriendo ahora los dedos desde *Mica*, corresponde la sementera en *Hisca*, interceptando á *Muyhica*, que está en medio de *Mica*, é *Hisca*. De modo que se hace en la luna décima tercia respecto de *Mica*.

Corramos últimamente los dedos desde *Hisca*, y se hará la sementera en *Suhuza*, interceptando dos signos: *Ta* y *Cuhupcua*, que están en medio de *Hisca* y *Suhuza*; esto es en la luna décima cuarta respecto de *Hisca*" (Duquesne, 1848, p409-410)

count has arrived at the *Ubchihica* finger. According to this, Duquesne means that the sowing occurs at the signs *Ata, Mica, Hisca,* and *Suhuza.*

- *"...Run* [from Ata] *the fingers, it corresponds in Mica the second sowing, intercepting to Bosa, that is in the middle of Ata and Mica".* First lunar year. Strictly, this *Mica* is *Quihicha Mica,* which is, the thirteenth moon from *Ata.* Again, Duquesne counts from the next sign of the referred one. Reviewing figure 3.7, we see this happens when he counts twelve fingers starting at *Bosa* and not at *Ata* (refer to the Roman numeration). The action of 'interception' can be interpreted as having one or two fingers between the current sign and the previous one.

- *"...Now running the fingers from Mica, the sow corresponds to Hisca, intercepting to Muyhica, which is in the middle of Mica and Hisca. Such that sowing is made in the thirteenth moon, with respect to Mica.".* Second lunar year. This *Hisca* refers to *Guetas asaqγ hisca,* the 25th moon of the Acrotom year (refer to the arabic numeration in figure 3.7).

- *"Finally, run the fingers from Hisca, and the sowing will be made on Suhuza, intercepting two signs: Ta and Cuhupcua, that are in the middle of Hisca and Suhuza; this is in the fourteenth moon respect to Hisca".* Third lunar year and an intercalary month. Strictly, *Suhuza* refers to *Guetas asaqγ quihicha suhusa,* the 38th moon, which is the first moon of the next Acrotom year; effectively, Duquesne describes it as "true January". *Cuhupcua,* refers to *Guetas asaqγ quihicha cuhupcua,* the 37th moon, the one to be intercalated, the action entailing the interception of two signs[28]. Note that the meaning of *Cuhupcua,* is *deaf person,* according to Duquesne. The Muisca linguistic talent arranged

[28]Note in the figure 3.7 that the number XIII corresponds to *Suhusa,* because the count is done from *Bosa,* not *Ata.*

to assign a metaphor commanding the user "to ignore" or "not to consider" such a sign of the intercalary month.

3.3.10 The Solar Year

Although there is no direct reference in the Duquesne's work of a Solar Year, the mere definition of the Acrotom Year implicitly entails that some kind of solar-based account of time was performed by the Muisca. An important clue is given by Simón when he comments a Muisca myth of creation where, in the beginning, only existed Caciques *Ramiriquí* and *Sogamoso*, who from yellow earth created the men and from a tall-hollow herb the women, afterwards, *Ramiriquí* ascended up to sky becoming the sun, then *Sogamoso* followed him converted in the moon. Simón inform us also that this mythical event *"happened in the month of December, so in commemoration of this event, the indians of this province, especially the ones of Sogamoso, used to perform in this month a feast named* huan..."[29].

Such ceremony of *Huan*, apparently had a close relationship with Rural Year (see section 3.3.7), as it can be deduced from the rest of the description:

> ...there went out twelve men, all wearing red dresses and garlands with a small bird in the brow. Among these twelve, it was another one dressed in blue, and together they sang in their tongue about how all of them were mortals and how their bodies will become ash: they said this with so sadly words such the audience sobbed and cried, so, it was law that in order to comfort them, the Cacique invited and cheer up them with a lot of wine, which made them to abandon the sadness' house and fully entered into the happiness and forgetting of death one.[30]

[29]"Esto, según se cuenta, sucedió por el mes de Diciembre, y así en recuerdo y memoria de este suceso, hacían los indios de esta provincia, en especial los Sogamosos, en este mes, una fiesta que llamaban huan..."(Simón, 1625, p312)

[30]"..salían doce, vestidos todos de colorado, con guirnaldas y chasines que cada una de ellas

although it is not clear whether this 'December' corresponds to a Rural (lunar) Year or a solar one, it have been suggested elsewere (Correa, 2004), that the *Huan* was performed during the December's solstice. Chapter 4 will show that the same relationship is present in a similar ceremony occurred in 1563 in the village of Ubaque.

It can be concluded so far, that the Muisca were aware of the annual movements of the sun and took care of the solsticial extremes. Probably akin ceremonies were performed during the June solstice and the March and September equinoxes as well, however, we lack of information about them in the ethohistorical sources.

3.3.11 The Cycle of *Ata*

According Father Duquesne, the Muiscas would count the moons in the Zocam and Acrotom accounts, in such a way that a given Moon should have a corresponding number (or sign) referring to the month in both systems. If both the Zocam and Acrotom years start simultaneously, their numbers will coincide until the 20th moon, such that, the next moon will be the first moon of the next Zocam year and the 21th of the same Acrotom year. Furthermore, the next moon will be the 2nd Zocam month and the 22th Acrotom month, and so on, both accountings return to the same starting numbers and the cycle is complete. This would lead to span of 740 moons. However, following the description provided by Duquesne a shorter span of 160 moons appears, instead of 740. The reason for such a difference can be extracted from the same description, and will be explained. Such 160 moon timespan will be denominated as the *Cycle of Ata*.

---

remataba en una cruz, y hacia la frente un pájaro pequeño. En medio de estos doce de librea estaba otro que la tenía azul, y todos éstos juntos cantaban en su lengua cómo todos ellos eran mortales y se habían de convertir los cuerpos en ceniza, sin saber el fin que habían de tener sus almas: decían esto con palabras tan sentidas que hacían mover a lágrimas y llantos los oyentes con la memoria de la muerte, y así era ley que para consolarlos de su aflicción, había de convidar á todos el Cacique y alegrarlos con mucho vino, con que salían de la casa de la tristeza y se entregaban del todo en la de la alegria y olvido de la muerte..."(Simón, 1625, p313)

Duquesne describes the Zocam dates that are passing as the Acrotom years goes by, until they become synchronized again:

> ...*[The Acrotom years method]* would have been confusing, if it had not been established under a fixed procedure with simple and general rules. It had four signs assigned to achieve such a goal: First *Ata*; then *Suhusa*, in the three last *[signs]* of the year, which they so-called the tail; *Aca* and *Gueta*, which were those that concluded the twenty moons year and that we therefore can call terminals. So, beginning by *Ata*, corresponded the number 17 of the next *[Zocam year]* to *Cuhupcua*, who by this intercalation they called the 'deaf person', and sowing was carried out in the next one, *Suhusa* 18. Spent the year of twenty moons, corresponded the number 17 of the next one to *Muihica*, the 'blind person', the sowing and representation of the first month passed to *Aca*. In the biennium of this one corresponded the number 17 to *Hisca*, and *Gueta* entered in the place and function of *Aca*, which in its biennium was 17, *Ta*, and the turn came back to the first one, *Ata*.[31]

This procedure, may seem confusing at first. However, one must analyze the text carefully, using the table of the Appendix B[32]. This will help to understand the sequence:

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[31] "...*[El método de los años acrótomos]* hubiera sido muy expuesto y confuso si no se hubiera establecido bajo un pie fijo y con reglas fáciles y generales. Tenía pues, destinados para este objeto, cuatro signos: el primero *Ata*, y los tres últimos del año *Suhusa*, al cual llamaban por esto, la cola; *Aca* y *Gueta*, que eran los que fenecían el año de veinte lunas y a los que por esta razón podemos llamar terminales. Comenzado, pues por *Ata*, tocaba al número 17 del siguiente a *Cuhupcua*, a quien por esta intercalación llamaban con toda propiedad el sordo, y se hacía la siembra en el siguiente *Suhusa* 18. Pasado el año de veinte lunas, al siguiente tocaba el número 17 a *Muihica*, el ciego, y pasaba la siembra y representación del primer mes a *Aca*. En el bienio de éste correspondía el 17 a *Hisca*, y entraba *Gueta* en el lugar y en los oficios de *Aca*; en su bienio era 17, *Ta*, y volvía el turno al primero, *Ata*." (Duquesne, 1882, p218)

[32] **Important**: The text from this section (3.3.11) to section (3.3.12) requires the reader to have in hand the Appendix B in order to track the described sequences of moons (particularly, their numbers).

- *"So, beginning by Ata, corresponded the number 17 of the next [Zocam year] to Cuhupcua, who by this intercalation they called the 'deaf person', and sowing was carried out in the next one, Suhusa 18."* According to this passage the Acrotom year is presented in the form of $20 + 17$ months. *Cuhupcua* is being related to the 37th moon, which is, *Guetas asaqγ quihicha cuhupcua*. When the sowing is made in *Suhusa* is put forth it refers to *Guetas asaqγ quihicha suhusa*, the 38th moon. This becomes the first month of the next Acrotom year. Note that this sowing agrees with the description of the figure 3.7.

- *"Spent the year of twenty moons, corresponded the number 17 of the next one to Muihica, the 'blind person', the sowing and representation of the first month passed to Aca."* *Muihica* represents the 74th moon (*Guemicas asaqγ quihicha*[33]), and the end of the second Acrotom year. Using the table in Appendix B, we see that the 75th moon corresponds to *Quihicha Hisca*. According to the calendar wheel, should be in the first month of the third Acrotom year. In this point, something else arises: In the absence of further explanation from Duquesne, he asserts that this first month is *Aca*, and not *Hisca* as could be interpreted. By examining the table, we see the 79th moon, *Quihicha Aca*, which seems to be the one referred to in the text. If this is correct, a shift of four months, *Quihicha Hisca* (75th), *Quihicha Ta* (76th), *Quihicha Cuhupcua* (77th), *Quihicha Suhusa* (78th) is performed.

- *"In the biennium of this one [Aca] corresponded the number 17 to Hisca, and Gueta entered in the place and function of Aca"* Effectively, 37 moons after the 79th moon *(Quihicha Aca)*, we arrive at *Quihicha Hisca* (115). Then, another shift of four months occurs: *Quihicha Ta* (116), *Quihicha Cuhupcua* (117), *Quihicha*

[33]From this point I will dispense with giving the whole name of a Muisca number, and I only will use the *Quihicha* prefix, when necessary. The reader is warned about the occurrence of several name repetitions, referring to different Moons. In order to avoid falling in the same confusion of the Duquesne's texts, the respective moon number is indicated between parenthesis.

Suhusa (118) and *Quihicha Aca* (119) are skipped; the 120th moon, *Quihicha Ubchihica* (or *Gueta*), thus becomes the first month of the fourth Acrotom year.

- *"...in its biennium [the corresponding to Ubchihica] it was 17, Ta, and the turn came back to the first one, Ata."* Finally, another shift of four moons occurs: *Quihicha Cuhupcua* (157), *Quihicha Suhusa* (158), *Quihicha Aca* (159) and *Quihicha Ubchihica* (160). This is done in order to complete a 160 moon timespan, forcing the Zocam and Acrotom accounts to synchronize, beginning a new cycle in the 161th month with the same name *Ata* for both accounts.

This Cycle of Ata is made up of a series consisting of four acrotom years. Each year was headed by the signs *Ata, Suhusa, Aca* and *Ubchihica,* but the end of the last three years it was intercalated by four months for each one, adding a total of 12 moons, or one lunar year. As a result, this cycle has a span of 160 moons:

$$(37☾ \times 4) + (4☾ \times 3) = 160☾$$

which is also:

$$8 \text{ Zocam years} = 160☾$$

this corresponds also to 12 solar years and 342 days, which is almost thirteen solar years. It is important to note that this intercalation of three series of four moons (12 moons) forces the synchronization of signs to take place over a 160 moon span; otherwise, such a synchronization would happen only after a 740 moon span, which corresponds to the *Acrotom Century*, yet another cycle. Despite the fact that Duquesne did not mention such intercalated moons directly, we will see that such a play of intercalations is important to manage larger time spans on the order of centuries. Such intercalations are shown in Appendix B, under the heading *Supplemental Series*.

3.3.12 Muisca "centuries"

According to Duquesne, the Muiscas had two varieties of long term cycles, apart from the *Ata Cycle* and are described as 'centuries', based on a series of lunar months as well.

The first period consists of twenty by twenty moons (20×20) or twenty *Zocam* years, that is four hundred lunar months. It is equal to 11812.236 days, and corresponds to 32 solar years and 124 days[34]. The priest also notes a functional analogy between the *Zocam* and the Mexican *Xiuhmolpilli*:

> ...Twenty moons, thus, made one year. Once finished, they counted another twenty, and so on, turning in a continuous circle until reaching a twenty of twenties...[35]
>
> ...[this] year of twenty moons is called *Zocam* (...) a very significant term, that expresses the union of one with the another, this is, from one year of twenty moons spent, to the next twenty-moon year, following its turn in a continous circle; an energetic word that corresponds to the *xiuhmolpili* whereupon the Mexicans knew their famous fifty two years wheel, which means in that language, fastening of the years.[36]

as a convention, this kind of century will be renamed as *Zocam Century*.

The second period consist in a span of twenty by thirty seven moons (20×37) or twenty Acrotom years[37], which corresponds to 740 moons. Duquesne refers to this period as a 'Muisca Century':

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[34]We consider here a lunar synodic period of 29.530589 days

[35]"...Veinte lunas, pues, hacían el año. Terminadas estas, contaban otras veinte, y así sucesivamente, rodando en un círculo continuo hasta concluír un veinte de veintes..." (Duquesne, 1848, p409)

[36]"...[Este] año de veinte lunas llamaban *Zocam* (...) término muy significativo, que expresa la unión del uno con el otro, esto es, del año de veinte lunas que pasó con el de las otras veinte que sigue para seguir su vuelta en un continuado círculo; palabra enérgica que corresponde a la *xiuhmolpili* con que los mexicanos conocían aquella su célebre rueda de cincuenta y dos años, que en aquella lengua quiere decir atadura de los años." (Duquesne, 1882, p219)

[37]Or 37 Zocam years.

> The Muisca century consisted of twenty intercalary years of 37 moons. Each one, corresponds to 60 of our years, and is composed of four revolutions counted by five in five, each one consists of ten Muisca years, and fifteen of our years, until completing twenty, in which the sign *Ata* takes the turn from where it started. The first revolution was finished in *Hisca*, the second one in *Ubchihica*, the third one in *Quihicha Hisca* and the fourth one in *Gueta*.[38]

740 moons correspond to 59.83 solar years, which differs to 60 solar years in about two months, due to the difference of 3.11 days between an Acrotom year (1092.63 days) and three solar years (1095.75 days) (see section 3.3.9). However, it is unknown whether the Muiscas were aware of this mismatch and devised a correction.[39]. Until new evidence comes to light, we have to consider this difference as an inaccuracy of the Muisca system; possibly the Acrotom year was only an approximation to indicate the days that an empirical observation of the sun was mandatory in order to apply a correction, in a similar way that has been suggested for the Inca calendar (B. Bauer, 1995).

Each one of the four revolutions described covered five Acrotom years, which corresponds to 185 moons:

$$\begin{aligned} 740☾ &= 4 \times (5 \text{ Acrotom years}) \\ 37☾ \times 20 &= 4 \times (5 \times 37☾) \\ &= 4 \times 185☾ \end{aligned}$$

[38] "El siglo de los Muyscas constaba de veinte años intercalares de 37 lunas cada uno, que corresponden á 60 años nuestros, y le componían de cuatro revoluciones contadas de cinco en cinco, cada una de las cuales constaba de diez años muyscos, y quince nuestros, hasta completar los veinte, en que el signo Ata vuelve á tomar el turno de donde comenzó la vez primera. La primera revolución se cerraba en *Hisca*, la segunda en *Ubchihica*, la tercera en *Quihicha Hisca* y la cuarta en *Gueta*". (Duquesne, 1848, p410)

[39] A satisfactory correction would be to add a day to each rural year of the Acrotom year plus another day to the intercalary month. In this way, the Acrotom year would have 1096 days, and an Acrotom Century would be 60.0136 solar years long, with a closer difference of about four days.

these are approximately fifteen solar years (14 solar years, 350 days), and correspond to the months 185, 370, 555 and 740; these values match the symbols given by Duquesne. As a convention, this kind of century will be renamed as *Acrotom Century*.

At this point, it is interesting to note that the Acrotom Century and its four revolutions do not account for the Cycle of Ata, which alternatively seems to be associated with the 400 moon period. This period is described by Duquesne as the 'Vulgar Century':

> ...after a Muisca vulgar century of 20 moon years plus 17 years, such that a finished century, or astronomical revolution of 20 intercalary years consisted of 37 moons each, three vulgar years are needed to complete two vulgar centuries. Thus, arriving at this case, they do not account for these three vulgar years that they were not needed for sowing, religion, or history, and they started a vulgar year in Ata (to which it was arrived the turn), beginning of a new century that completely resembles the first one, which we have described.[40]

These described 'vulgar years' are, in fact, Zocam years. Hence, the 'Vulgar Century' refers to the timespan we have renamed as *Zocam Century*. Two Zocam Centuries correspond to 800 moons, while an Acrotom Century is 740 moons. This gives a difference of 60 months, and are the same three Zocam years referred to by Duquesne. It appears that the clergyman was unable to explain how the Muiscas dealt with such a difference, and he assumed that they merely ignored such a timespan and restarted the counting of a new century. He did not realized, that it

[40]"...despues de un siglo vulgar muysco de años de 20 lunas, y mas 17 años, de suerte que, terminando el siglo, ó revolución astronómica de 20 años intercalares de 37 lunas cada uno, les faltan tres años vulgares para completar dos siglos vulgares. En llegando pues á este caso no hacian mas cuenta de aquellos tres años vulgares de que no necesitaban para la labranza, ni para la religión, ni para la historia, y empezaban en Ata (á que habia llegado el turno) un año vulgar, nuevo principio de un siglo nuevo en todo semejante al primero que hemos descrito". (Duquesne, 1848, p417)

was the Cycle of Ata that really fit a 800 moon period, this being the intercalations of a four moon series described as the 'Supplemental Series' (see Section 3.3.11 and the Appendix B) the responsible to accumulate the sixty moons required to complete the 800 moon span or two Zocam centuries. Therefore, in a similar fashion to the Acrotom century revolutions, two Zocam centuries can be divided by five consecutive Cycles of Ata:

$$\begin{aligned} 800☾ &= 740☾ + 60☾ \\ 400☾ \times 2 &= 5 \times \text{Cycles of Ata} \\ 20☾ \times 20 \times 2 &= 5 \times ((4 \times \text{Acrotom year}) + (\text{Lunar year})) \\ &= 5 \times ((4 \times 37☾) + (3 \times 4☾)) \\ &= 5 \times 160☾ \end{aligned}$$

It appears, that multiplying the timespan of the Zocam centuries by two gave a more numerically akin period to an Acrotom century than 400 moon span. Therefore, we could rename this 800 moon span as the *Extended Zocam Century*. Both the Acrotom century and the Extended Zocam centuries are summarized in the Table 3.5.

CENTURY TYPE	☾	DIVISIONS	NAME DIV.	DAYS	YEARS
Acrotom	740	$4 \times 185☾$	"Revolutions"	21852.6914	59.8306
Extended Zocam	800	$5 \times 160☾$	Ata Cycle	23624.5664	64.6819

Table 3.5: Values of the two muisca "centuries"

The function of the Cycle of Ata would be to split two zocam Centuries into portions, similar to those of the Acrotom Century revolutions, giving an apparent synchronization of month signs of the Zocam and the Acrotom years in a timespan of 160 moons, shorter than 740 moons —or one Acrotom century— being the least common multiple of 37 and 20 moons. It is important to note that if in a certain moment both the Acrotom and Extended Zocam centuries would begin synchro-

nized, they will return to their common origin after 29600 moons[41] (or 2393.2193 solar years). As a consequence, as that centuries go by, the number of moon indicating each Acrotom century revolutions, will shift with respect to the *Zocam* centuries, but always conserving their number sign (or name), *Hisca*, *Ubchihica* and *Gueta*. For example, once the first Acrotom century is finished, the first revolution of the following Acrotom century, occuring 185 moons later, would finish at the 125th moon of the second Extended Zocam century, or the 925th moon, with respect to the common origin of the Acrotom and Zocam centuries. This differs with the number of moon for the same revolution occuring in the first Extended Zocam, the moon 185th, being evident such a shift.

3.3.13 The *Bxogonoa* and the "Bochica's dream" as long term timespans

Until this point in the analysis of the Duquesne's calendrical model, the 29600 moon cycle is derived as the mere theoretical result of combining the spans of both the Acrotom and Extended Zocam Centuries. Duquesne does not mention such a cycle, and apparently does not take its existence into account. However, Pedro Simón's historical account provides new information that, when interpreted through Duquesne's calendrical system, gives a clue that effectively points out that the Muiscas knew of such a cycle, and in addition they apparently had defined some associated long-term periods of time. In his *Noticias Historiales*, Simón describes the myth of the last coming of the civilizing hero Bochica, in accordance with the traditions of Bogotá (south) and Sogamoso (north). For the Bogotá tradition, he wrote:

> ...It helps a very true tradition a lot that everybody has in this reign,

[41] Least common multiple of 740 and 800.

> arrived into it twenty ages ago, and each age counts as seventy years, an unknown old man, dressed in wool, with long hair and a beard down to his waist... [42]

and, for Sogamoso:

> ... [And] four ages ago, so-called as Bxogonoa, a man came with the same shape and dress we described in the lands of the Bogota...[43]

It is clear that both citations refer to two different 'ages' but they express the same timespan: the *Coming of Bochica*. Rozo Gauta (1997), estimates these 'twenty ages' as about 1400 years and each *Bxogonoa* as 350 years. However, Rozo considers these spans as unlikely, and concludes that such denominations only indicate the multiple ways to objectivize the time among the northern and southern Muisca traditions.

The 70 year span described by Simón for one such 'ages' does not match any of the periods described by Duquesne. Nevertheless, the context of Simón's narration shows such ages as century-like periods. Did there exist an alternative period of 70 years, unknown to Duquesne, or did Simon simply give a wrong value?

Considering the astronomical and archaeological factors discussed in chapters 4 and 5, which support Duquene's model, and the 20-based arithmetic of the muiscas, it is possible that perhaps Simón, or a scribe that copied the original manuscript, may have misspelled the original word describing the value of such an age. In Spanish, the number 60 is written *'sesenta'*, whilst 70 is *'setenta'*,

---

[42] "...A que ayuda mucho una tradicion certísima que tienen todos los de este Reino, de haber venido a el, veinte edades, y cuentan con cada edad setenta años, un hombre no conocido de nadie, ya mayor en años y cargado de lanas, el cabello y barba larga basta la cintura..."(Simón, 1625, Not. 4, chap. III, p.284)

[43] "habra cuatro edades, que las nombran por este vocable Bxogonoa, vino un hombre del mismo talle y vestido que le pintamos tratando de el en estas tierras del Bogota."(Simón, 1625, Not. 4, chap. IX, p.314)

the error of writing an 's' as a 't' is likely due to the handwritten nature of the transcribed palaeographic document.

Considering this hypothesis, we can attempt to check whether such 'ages' match Duquesne's model. Assuming that misspelled ages correspond to periods of 60 years, it becames quite apparent that such ages refer to Acrotom Centuries. We could therefore establish:

$$1 \text{ age} = (\text{possibly}) \ 60 \text{ solar years} \quad \sim \quad 1 \text{ Acrotom Century} = 740☾$$

Then,

$$\begin{aligned} 20 \text{ ages} &= 20 \times 740☾ \\ 20 \text{ ages} &= 14800☾ \end{aligned}$$

Effectively, the 14800 moon span, is half the 29600 moon cycle, and corresponds both to the zocam year number 740, and the acrotom year number 400. Therefore, it marks the 37th Zocam Century and the 20th Acrotom Century. This match now suggests that, the 'transcription error' hypothesis is probably correct.

Continuing in this direction, it can be assumed that the related 20 ages for the northern Muiscas correspond to the 4 *Bxogonoa* of the southern Muiscas. If so, it becomes easy to set up an equation to determine the duration of a *Bxogonoa*:

$$\begin{aligned} 4 \textit{ Bxogonoa} &= 20 \text{ ages} \\ &= 20 \times 740☾ \\ &= 14800☾ \\ 1 \textit{ Bxogonoa} &= \tfrac{1}{4} \times 14800☾ \\ &= 3700☾ \end{aligned}$$

A *Bxogonoa* is composed of 3700 moons, which corresponds to 185 Zocam years (or 100 Acrotom years), which are also equal to 5 Acrotom Centuries. A *Bxogonoa*,

corresponds to a span of 299.1579 solar years. Therefore, the 29600 moon period will correspond to 8 *Bxogonoa*.

With this point in mind, it is important to turn back to one of Duquesne's citation(previously mentioned on page 55), wherein he refers to *"the mysterious dream of their memorable Bochica lasted in his fantasy twenty times five twenties of years"*. How can this timespan be expressed? If we again use the Acrotom years we find:

$$\begin{aligned} \text{Bochica's dream} &= (20 \times (5 \times 20)) \times 37☾ \\ &= 74000☾ \end{aligned}$$

this corresponds to 3700 Zocam years or 2000 Acrotom years, which is equal to 185 Zocam centuries and 100 Acrotom centuries, thus giving a time span of 5978.3691 solar years. Alternatively, if we try to express this 74000 moon span in terms of *Bxogonoas*, we obtain a pleasing result:

$$\frac{74000☾}{3700☾} = 20☾$$

Bochica's dream appears to be the next multiple ($\times 20$) level of the *Bxogonoa*.

It can therefore be concluded that the 'dates' of both the coming of Bochica and his 'misterious dream' are not historical dates, rather they are mythical time spans profoundly bound to the arithmetical structure of Muisca timekeeping system.

The transcription error hypothesis allows us to understand the information given by Simón in relation Duquesne's model, solving an apparent mismatch between the two sources. This argument was used by scholars to dismiss Duquesne's model (Restrepo, 1892).

3.4 A general organization of the system

After having presented Duquene's model and all the derived time spans, one could have a confused picture of these time spans, as shown in the order of moons

as follows:

Time span	Moons	Referred by
Rural Year	12	Simón, Humboldt
Zocam Year	20	Duquesne
Acrotom Year	37	Duquesne
Ata Cycle	160	Deduced from Duquesne
Astr. Revolution	185	Duquesne
Zocam Century	400	Duquesne
Acrotom Century	740	Duquesne
Ext. Zocam Century	800	Deduced from Duquesne
Bxogonoa	3700	Simón
Bochica's coming	14800	Simón
29600 moons cycle	29600	Calculated by Izquierdo
Bochica's Dream	74000	Duquesne

How are they organized? Upon a closer examination it can be stated that the *Acrotom year, Acrotom century, Bxogonoas, Bochica's coming*, and *Bochica's dream* belongs to a sequence u that can be described mathematically as:

$$u_{n,k} = n\mathbf{a}\mathbf{z}^k$$

where $\mathbf{a} = 37$, $\mathbf{z} = 20$, n and k are natural numbers, whereby $n > 0$. Therefore, such time spans appear to correspond to the obtained values for $n = 1$ and $n = 5$, and $k = 0$ to $k = 2$:

n	$u_{n,0}$		$u_{n,1}$		$u_{n,2}$	
1	**37**	←Acr. Year	**740**	←Acr. Century	**14800**	←Bochica's Coming
2	74		1480		29600	←29600 moon cycle
3	111		2220		44400	
4	148		2960		59200	
5	**185**	←Astr. Revolution	**3700**	←Bxogonoa	**74000**	←Bochica's Dream

According to this, these time spans could be organized as value couples, wherein the second value of a couple is 5 times the value of the first. Furthermore, these couples are organized into three levels or orders, based on the value of k:

$$\left.\begin{array}{ll} \text{Acrotom year} & = 37 \times 20^0 \\ \text{Astr. Revolution} & = 5 \times 37 \times 20^0 \end{array}\right\} \text{1st order}$$

$$\left.\begin{array}{ll} \text{Acrotom Century} & = 37 \times 20^1 \\ \text{Bxogonoa} & = 5 \times 37 \times 20^1 \end{array}\right\} \text{2nd order}$$

$$\left.\begin{array}{ll} \text{Bochica's coming} & = 37 \times 20^2 \\ \text{Bochica's Dream} & = 5 \times 37 \times 20^2 \end{array}\right\} \text{3rd order}$$

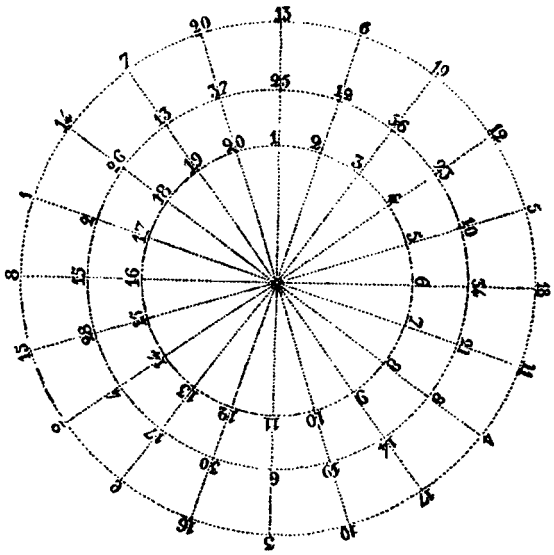
Note that the Ata Cycle and the Zocam Centuries are independent of this sequence. Alternatively, they belong to another sequence v as described by:

$$v_{n,k} = \mathbf{a}^k \left(4\mathbf{a}n + 12n\right)$$

where $\mathbf{a} = 37$, wherein the Ata cycle will correspond to $v_{1,0} = 160$. In the Extended Zocam century $v_{5,0} = 800$, and in the 29600 moon cycle $v_{5,1} = 29600$. The occurrence of the 29600 cycle in both sequences $u_{5,2} = v_{5,1}$ is explained by the fact that such a number is the least common multiple of the two sequences.

3.5 The 'Table of the Muisca years'

In the last part of his work, father Duquesne shows a table that was apparently designed by him, and compiles the number of intercalations along the Acrotom Century. Such a table is composed of three concentric circles, each one having twenty values (see figure 3.8) which are explained by Duquesne as being:



Outer circle:	13	6	19	12	5	18	11	4	17	10	3	16	9	2	15	8	1	14	7	20
Middle circle:	25	12	36	23	10	34	21	8	14	19	6	30	17	4	28	15	2	26	13	37
Inner circle:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Figure 3.8: Duquesne's Calendar Table

> ...The inner circle represents the 20 moons of the vulgar Muisca year[44], of which signs are intercalated throughout in the span of the century.
>
> The second circle represents the Muisca years corresponding to the intercalation of each sign.
>
> The third circle expresses the order of this intercalation.[45]

This table can be checked against the Century table provided in Appendix B. For example, when reading the corresponding values of the first intercalation as shown in Duquesne's table, the following are retrieved when moving from outer to inner circles: 1, 2, 17. The first intercalation, corresponds to the number 1, which

[44] a.k.a. the Zocam year

[45] "...El círculo interior representa las veinte lunas del año muysco vulgar, cuyos signos todos se intercalan en el espacio del siglo... El círculo segundo expresa los años muyscas a que corresponde la intercalación de cada signo... El círculo tercero expresa el orden de esta intercalación" (see *Disertation; Astronomical Ring*)

will happen during the 37th moon of the Acrotom Century. This is labeled in Appendix B as *Quihicha Cuhupcua*, thus matching with the number 17 of Duquesne's table. Such a moon is also the 17th moon of the *second* Zocam year, which whose start point is labeled by the symbol z_1 in the 20th moon . Note that the index of such a symbol shows that the number of Zocam years just finished. Therefore the number of the current Zocam year can be expressed as z_{n+1}, which corresponds to the number 2 of Duquene's table. Consequently, it describes that the first intercalation occurs *during* the second Zocam year of the Acrotom Century.

Part III

Ethnohistorical and Archaeological connections

Introduction

Part III of this study seeks to examine and establish potential connections between the ethnohistorical (chapter 4) and archaeological (chapter 5) data, which support the model of the Muisca Calendar, previously discussed in chapter 3. The intention here is not to put forth a complete validation of such a model, rather these chapters are aimed at compiling an initial set of relevant information, which may provide elements to support the future research on this subject.

Due to the hypothetical nature of many elements covered in these chapters, a strong emphasis will be placed on the framework proposed by Belmonte (see section 1.4) to properly frame the proposed suggestions in a responsable and academic manner.

Chapter 4

Ethnohistorical clues as to the understanding of the Muisca Century

4.1 The Ubaque's ceremony of 1563

In December of 1563, the colonial authorities of Santa fé de Bogotá were alerted to the organization a massive ceremony in a valley called Ubaque, located east of the capital of the New Granada, which was named after the ruler *(Cacique)* of thas land. It was clear that this ceremony appeared to involve the perfomance of the forbidden rituals of the native religion, which under the european view had many expresions of idolatry, practice condemned by the Spanish authorities.

Immediately, the local authorities dispatched an inquiry on the spot, in order investigate the idolatrous nature of this ritual, and if that would be the case, to react accordingly. The commission arrived on Ubaque, and observed part of the ceremony, and was effectively condemned as idolatry. The authorities put on abrupt stop to the ceremony, and proceeded to arrest the main persons involved in such ritual. These included the Cacique Ubaque, and other *caciques* coming from other regions of the ancient muisca territory. A trial, soon followed, especially against

the Cacique Ubaque.

The documentation that comes from this trial is one of the earliest and most detailed historical source of data about the religious activities of the Muiscas. Currently, most of the documentation is conserved in the Archivo General de Indias (Spain). A detailed transcript of each archived item, accompanied with a detailed ethnohistorical analysis of the trial, can be found in Casilimas and Londoño (2001); Londoño (2001)

The document brings a detailed description of the performance of Muisca rituals, or at least of the public activities that the Spaniards witnessed. These activities included massive procession of people organized in groups or delegations by the region from which they came (to assist in this ceremony), the playing of sad and melancholic music, the performing of *borracheras* (drunkenness), a term used by the Spaniards to describe the drinking of *chicha* (corn beer), but actually, such an activity may be associated with the ingestion of hallucinogen substances also, such as Yopo. Also included the ritual was the use of paraphernalia, for example masks, nets, metal jewerly. The Spaniards were especially concerned whether human sacrifices were done in such ceremonies, because as it was known since before the arrival of the Europeans that such ceremonies sometimes included the sacrifice of boys.

4.1.1 Significance of this event

This ceremony certainly had a huge importance for the Muiscas at that moment. Basically, it was in direct defiance of the Christian establishment, done in an era when both the Spanish and the Muisca powers were involved in a process where one was expanding whilst the other was diminishing, or at least, fading into a subversive existence. It is important to note that the Cacique Ubaque did not intend to hold a secret reunion; on the contrary, he called several caciques to attend the

ceremony openly. With the aid of his *encomendero*, Juan de Cespedes, who signed letters to authorize Ubaque's messengers to go across the territory, Ubaque summoned the caciques of several towns in the region to come to his town to perform the ceremony. He sent his messengers at the beginning of December in order to give the guests time to prepare for the ceremony. In spite of the clear illegal aspect of the gathering, several caciques answered the summons, sending a delegation of about ten to twenty persons as representatives of their towns. The caciques themselves went with the delegations, or in the cases of such caciques who feared repercussions, they sent their *capitanes*:

> ... the caciques and capitanes that came are, Bogotá, Suba and Tuna, Hontibón, Boza, Ciénega, Chía, Tibacuy, Pasca, Sichaque, Queca, Une, Pasusaga, Cáqueza, Susa, Tuche, /(1417r.) Teusacá, Fitatá, Cota, Cajicá, Sopó, and tmore more [caciques] came than the ones that had [already] spoken. [The cacique Ubaque] was asked why the caciques that he had invited did not come and sent instead their capitanes, and he said it was because they feared that the *Oidor* or another *Zipa* would come to seize them...[1]

The number of chiefs who attended the ceremony were certainly more than the ones Ubaque confessed, it may amount to thirty names of caciques and capitanes in the documentation of the trial. Essentially, such a ceremony was performed by people coming from the majority of the towns of the southern part of the Muisca territory, corresponding to the ancient lands of the Zipa Bacata. However, the document mentions that the summon was extended far into the northern lands of

[1] "...son los caciques y capitanes que han venido Bogotá, Suba y Tuna, Hontibón, Boza, Ciénega, Chía, Tibacuy, Pasca, Sichaque, Queca, Une, Pasusaga, Cáqueza, Susa, Tuche, /(1417r.) Teusacá, Fitatá, Cota, Cajicá, Sopó, e que no han venido más de los que han hablado. Preguntado que cómo no vinieron los caciques que ha declarado y enviaron sus capitanes. Dijo que porque se temían que había de venir el dicho señor oidor o otro Çipa a prenderlos." (Casilimas and Londoño, 2001, f1417r)

Tunja and Sogamoso:

> ...[They] have brought news of how in the town and land of the Cacique Ubaque a big meeting of Indians is to be held, summoned by the said Cacique and others, who come from the city of Tunja and other places, in order to make parties and races in order to celebrate idolatries and worship of the devil...[2]

> ... [so, he] went where this witness was, and was told how the Cacique Ubaque summoned him and who also summoned the caciques of all the lands, Sogamoso, and Guatavita, and all the people from the land of the city of Santafé, in order for everyone to meet in the town of Ubaque and make *borrachera*, and that Cacique Fusagasugá asked the witness for his permission to go to the gathering of Cacique Ubaque and celebrate *borrachera*...[3]

The multitudinous aspect of this ceremony impressed the Spanish witnesses who arrived there, some claim to be Luis de Peralta, who described in detail the multitude of people summoned, and of the rituals performed by them:

> [Luis de Peralta] found the Cacique and a lot of Indians, and he thinks that there could be more than ten thousand Indians in all... [unreadable] a roadway was in front of the the Cacique Ubaque's door, about ten or twelve steps wide and very long, along which he saw a

[2] "... se les ha dado noticia cómo en el pueblo y repartimiento del cacique de Ubaque se ordena grande junta de indios convocados por el dicho cacique y por otros, a donde vienen desde la ciudad de Tunja y otras partes para hacer convites y carreras en las cuales celebran idolatrías en culto y veneración del demonio..." (op. cit. , f1396)

[3] "...venido donde este testigo estaba le dijo cómo el dicho cacique de Ubaque lo había enviado a llamar y que también el dicho cacique de Ubaque había hecho llamar a los caciques de toda la tierra y Sogamoso y Guatavita y todos los de la tierra desta ciudad de Santafé y que todos se juntasen en el dicho pueblo de Ubaque a hacer borrachera y el dicho cacique de Fusagasugá pidió licencia a este testigo para ir al llamado del dicho cacique de Ubaque a la dicha borrachera" (op. cit. , f1398v)

> huge quantity of Indians forming squadrons, with boys behind them, all wearing net masks, lion faces, *totumo* masks, tin-beaded masks, leather masks, and all wearing the devil's image. They came playing whistles, flutes, jingle bells and other instruments, some came whistling, others crying, or howling, others singing painful and sad sangs, and the ones who wore the masks caused tears to be shed by the masks themselves. They came wearing shapeless dresses and badges that the witness was unable to describe. That day, he saw more [Indians] arrive by the same roadway, all with the same dresses, playing [music], crying, howling and groaning like lions or tigers, with too many differences that to name that he is not able to describe them all. He thinks that these actions were summons to the Devil, since the participants wore a lot of pointed hoods, painted smocks, and other kind of dresses that when seen, frightened [people]. The caciques and capitanes [already] announced were with the Cacique Ubaque, which had all met for the *borrachera* and offerings that the Cacique Ubaque performed...[4]

The raison-d'être for such a ceremomy, according to the witness interrogated in the later trial, was that Ubaque wished to celebrate his own funeral while alive. How-

[4]"...[Luis de Peralta] halló al dicho cacique y a muy gran cantidad de indios, que le pareció a este testigo /(1410r.) que habría en todos más de diez mil indios de que [ilegible: - -vada] una carrera que estaba delante de la puerta del dicho cacique de Ubaque, de anchor de más de diez o doce pasos e muy larga, por la cual vido que venían muy gran cantidad de indios en escuadrones con muchachos tras ellos, todos enmascarados con máscaras de redes y caras de leones y máscaras de tutumos y máscaras de estaño y cuentas y máscaras de cueros y todos puestos de la visión del demonio, los cuales venían tañendo con pitos y flautas y cascabeles y otros instrumentos, e unos venían silvando y otros llorando y otros aullando y otros cantando cantos tristes y dolorosos, y los que traían las máscaras traían lágrimas derramadas por ellas, y que venían de disformes vestiduras e insignias que este testigo no lo sabrá contar. E que hoy dicho día este testigo vido venir a mucha más cantidad por la misma carrera con las mesmas vestiduras, tañendo y llorando y aullando y gimiendo como leones o tigueres, de tantas diferencias que no sabrá este testigo contarlo, e que le pareció a este testigo que todo era invocación y llamamiento de los demonios; e que asimesmo traían en las cabezas muchas corozas y sayos pintados y otras formas de vestiduras que ponía espanto verlas. Y que esta/(1410v.)ban con el dicho cacique de Ubaque los caciques y capitanes declarados en la cabeza de la información, los cuales todos se habían juntado a la borrachera y obsequias que el dicho cacique de Ubaque hacía." (op. cit. , f1410r-f1410v)

ever, the elements shown in the description of the ceremony points to the fact that such a ceremony was the performance of a ritual associated to the reproduction of society, showing the death of the cacique as a catalyst to resurrect the social dynamics of the Muisca society (Correa, 2004). Thus, the interpretation of the Spaniards that this ceremony is a funeral could be incomplete. How could an apparent funeral attract thousands of people, coming from several places of the territory? The Spaniards were astonished with the massive response to Ubaque; it is clear that an event like this was not witnessed by the Europeans in all the twenty-five years they colonized New Granada. What did persuade to almost thirty muisca leaders to challenge the Spanish control against idolatry? It is very interesting that the records indicate chiefs considered enemies of Ubaque, were also summoned, as in the case of Capitán Riguativa, father of the Cacique Hontivon. Surprisingly, he accepted the summon and prepared a delegation of about twenty indians, who actively participated in the ceremony.

4.1.2 Astronomical aspects of the Ubaque ceremony.

From this, it is obvious that such a ceremony was not only a funeral, but it was a ritual moment of great importance for the Muisca society. I think its performance was a last salvo by a desperate culture in the process of changing due to an alien power that disrupted its ancient order of beliefs, and wanted to reconnect to its roots by means of the ritual.

It is very understandable that the performing of this ceremony was an act of resistance to the European invasion and the cultural disintegration that the Muiscas were subject to. But now a question arises, why this moment? Why not before, when the Spanish power was not entirely entrenched? According to several witnesses, a ceremony of this magnitude had not been seen in the territory since before the Spaniards arrived:

> [The witness was] asked about how many *borracheras* and offerings he has seen like the one done by the Cacique Ubaque and in how many he had participated. He said that since he was born, he only has seen a *borrachera* like this one that the Cacique Ubaque did, the one done by the Cacique Bogotá before the Christians came.[5]

It seems that ceremonies of such magnitude were not common, and the ones offered by Ubaque (and before by Bogotá) took place on special dates specified by the religious use of the calendar. Many religions used to schedule their ceremonies to specific moments on the calendars. So, it is plausible that the Ubaque's ceremony is not an exception. The same Cacique Ubaque gives us clues to point out that such a ceremony was comparable to the European's Easter:

> [Ubaque was] asked why he does such meeting and *borrachera*, if it is to honor the dead. He said that when God made the Indians, he left them this Easter as he did to the Christians, so they enjoy themselves like the Christians do.[6]

It is interesting to see that he refers to the ceremony as "Easter", meaning that this ceremony had a similar nature as the Christian Easter, in the sense that it is attached to a timekeeping system.

If this celebration is associated with a calendar system, we must firstly consider whether the time of the celebration's performance could be marked by special astronomical circumstances. After examining the position in the sky of Sun, Moon,

[5] "Preguntado cuántas borracheras y obsequias ha visto este que declara que se han hecho como la que hizo el dicho cacique de Ubaque y en cuántas se ha hallado. Dijo que desde que nació no ha visto más de otra borrachera como esta que hizo el cacique de Ubaque, que la hizo el cacique de Bogotá antes que los cristianos vinieran." (op. cit. , f1431r)

[6] "Preguntado que para qué efecto hace la dicha junta y borrachera y si es por honras de muertos. Dijo que cuando Dios hizo a los indios les dejó esta Pascua como a los /(1416r.) cristianos la suya, e que se holgaban como se huelgan los cristianos." (op. cit. , f1416r)

and the planets, specially Jupiter and Saturn, it is evidenced that such a time indeed had astronomical significance.

The Real Audiencia in Santafé de Bogotá was informed about the Muisca ceremony on December 20 of 1563. The dispatched commission arrived to the Ubaque's land seven days later. That day, most of the interrogated witnesses confessed to being summoned about eleven to twenty days ago, in the first or second week of December. The 1563 December solstice occurred on the 12th day[7], so it shows that the ceremony was started around the days of the December solstice. It seems very probable that such a solstice may have an important role in the performing of the ceremony.

Solstices seem to be associated to other religious ceremonies in the Muisca Culture; for example, chronicler Fray Pedro Simón (1629) informs us about another ceremony known as the *Huan*, which attributes the solstice to the notion of fertility. The December solstice coincided with the dry season in most of the territory of Colombia, and it is in this season that the preparation of the fields begins, in order to sow in the first months of the next year. This suggests that fertility was bound to the solstice.

During the December solstice, the sun reaches its maximum southern raising and setting points. The arrival of the sun into a determined point in the geography during this time could serve as a calendrical marker for any person aware of this phenomenon (Aveni, 1980).

On the other hand, the moon has more "erratic" behavior, when compared to the sun. Due to the inclination of its orbit, its raising points varies considerably each month, changing dramatically from northeast to the southwest in a short time. In the case of the Ubaque's ceremony, its raising point at the moment of

[7]This historical episode happened 19 years before the reform of the Julian calendar by Pope Gregory XIII, so the real date of the solstice was shifted several days before of the expected date, about December 21.

	Moon	Jupiter
Jupiter	3.7°	
Saturn	3.5°	4.1°

Table 4.1: Angular separation between Moon, Jupiter and Saturn during the conjunction of 30 December 1563

the full moon is very peculiar: the full moon occurred on December 29, and for that date, the moon's rising azimuth was very near (69.6°) of the raising point of the sun during the June solstice (66.4°). The possibility exists of a moon-sun association at that moment, each in a "mirror position", around the east cardinal point.

The moon and sun are not, however, the only celestial bodies in a special configuration that month. Surprisingly, the planets Jupiter and Saturn were in a continuous conjunction during the years 1562 to 1564, having a mean angular separation of 4.5° during the month of December of 1563 (figure 4.1). Their appearance was very obvious, like two nearby bright stars in the sky, and in the same way as the moon, they rise on the horizon at a point near where the sun rises during the June solstice, about 70° of azimuth. The moon joined into this planetary conjunction on December 30, having an angular separation of 3.7° with Jupiter and 3.5° with Saturn, but the bodies were below horizon at that moment (about 14:25h local time). On that same same day, when the three celestial bodies rose, the moon was displaced to the east, having a separation of 3.1° and 5.7° from Jupiter and Saturn, respectively (table 4.1).

In Europe, such astronomical phenomena attracted the attention of a well known astronomers of the time, Tycho Brahe (Moore, 2000), because it presented several astronomical conditions which can be summarized as: (a) sun in December solstice, (b) full moon in the vicinity (on the eastern horizon) of the June solstice, (c) planets Jupiter and Saturn in conjunction, and (d) such a conjunction is also in the

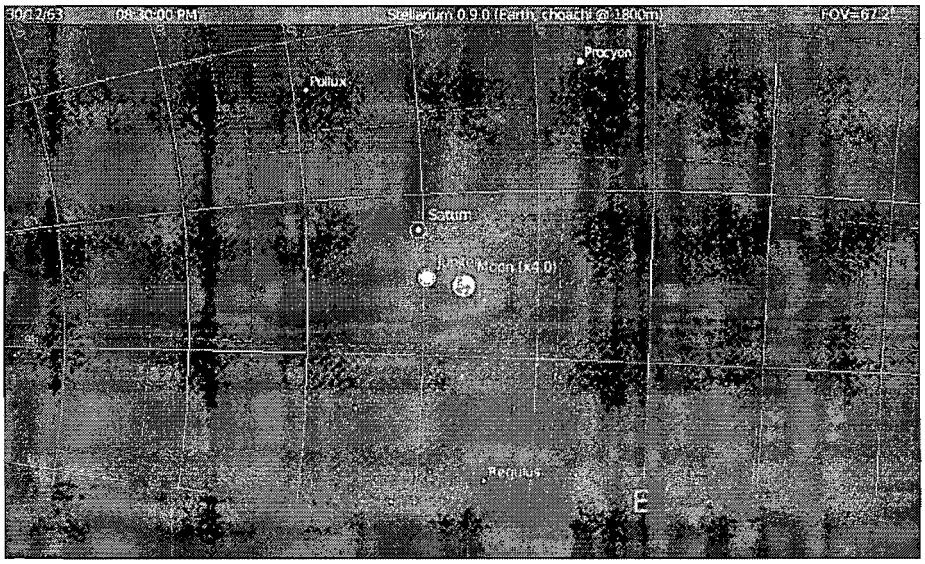


Figure 4.1: Simulation made in *Stellarium* (Chéreau et al., 2005) showing the Great Conjunction of 30 December 1563. The positions in the sky of Jupiter, Saturn and the Moon are shown as seen from the Ubaque's region, at 20:30, local time.

vicinity of the June solstice. According to this, such a moment offered a good set of astronomical circumstances to the Muisca priests, favorable enough to give a cosmic purpose to their religious practices.

A conjunction of Jupiter and Saturn is commonly known in astronomy as "The Great Conjuntion", and it is not an isolated event in time, but it obeys a cycle of about twenty years (19.86), when the conjunction occurs in a different place of the sky, returning approximately to the same point after three conjunctions, or sixty years (Etz, 2000). The cultural significance of such a cycle has been studied by Aston (1970) for the Western Culture, and by Sullivan (1988) for the Andean traditions.

4.2 The memory of a previous ceremony in other ethnohistorical sources

This ethnohistorical account is very valuable because it allows one possibility to hypotesize a close relationship between the astronomical cycle of Great Conjunctions and the structure of the Calendar. However, in order to test the validity of this hypothesis, it is necessary to check whether this ceremony was an isolated event, or if on the contrary, it belonged to an already established ritual system. Using the clue of the astronomical nature of this ceremony, we could expect the performance of such similar ceremonies in times associated with such conjunctions. Although the ethnohistorical available sources are sparse on in the astronomical topic, they are not, however, entirely void.

The works of chroniclers Fray Pedro Simón, Juan de Castellanos, Lucas Fernadez de Piedrahita, and Juan Rodriguez Freyle, written some years after the conquest of the Muisca territory, gives us some insight about the events that happened prior to the European invasion. In these, the political landscape of the Muiscas is described as a period of conflict, caused by the expansionist policies of a lineage of rulers known as the *Zipas*, who gained political control over the southern cacicazgos of the territory, and who defied the authority of the *Zaque* of Tunja, ruler of the northern territories. The Zipas, using the name of their home cacicazgo, are also referred to as the Cacique Bogotá. Despite the description of these wars as the product of a medieval misinterpretation of native conflicts, aimed to justify the European occupation (Correa, 2004), they provide enough historical evidence to derive conclusions about the calendar.

In the *El Carnero* (Freyle, 1636), an episode relates how the Bogotá's forces face the army of the Guatavita's Cacique, loyal to the Zaque ruler, and against whom Bogotá rebeled:

> The two armies were face-to-face, but, then there appeared signs of a break in the conflict. The night before battle, the priests, Xeques and Mohanes got together and addressed the chiefs and main army heads, arguing that now had came the time to make sacrifice to the gods, to offer them gold and incense, and particularly, run over the land and visit the sanctuary's lakes and conduct other rites and ceremonies; so, to be understood better, *they convinced the chiefs that the Jubilee year had arrived*, and it would be right to pacify the gods before the battle occurred, and in order to do it, it should be fair to allow a truce of twenty days or more...[8,9]

What is interesting in this event, is the reason that motivated the Xeques to stop the war and impose a truce: the arrival of the Jubilee year; in other words, it was the end of a century and the beggining of the next. The story tells us how the waring sides agreed to a truce and, similarly in the Ubaque's account, they all participated massively in the ceremony coordinated by the Xeques.

> ...The first ceremony they did was, form rings of both of factions combined, dancing men and women with their musical instruments, as if never existed any resentment between them or signs of war. In the prairie lying between the two rivers that divided the fields, they showed each other very joyfully, eating and drinking together in big *borracheras* that lasted all day and night, and those who could bed the most people was a hero, a sentiment that remains until today. The feast

[8] "...Afrontados los dos campos, dieron luego muestras de venir al rompimiento de la batalla: la noche antes del día que pretendían darse la batalla se juntaron sus sacerdotes, jeques y mohanes, y trataron con los señores y cabezas principales de sus ejércitos, diciendo cómo era llegado el tiempo en que debían sacrificar a sus dioses, ofreciéndoles oro e inciensos, y particularmente correr la tierra y visitar las lagunas de los santuarios, y hacer otros ritos y ceremonias; y para que se entienda mejor, los persuadieron que era llegado el año del jubileo, y que sería muy justo cumpliesen con sus dioses primero que se diese la batalla y que para podello hacer, sería bueno asentasen treguas por veinte días o más..."(Freyle, 1636, chap. IV:f10r)

[9] The *emphasis* is mine.

> and *borracheras* lasted three complete days, and on the fourth day, the Xeques and Mohanes got together and agreed to begin the land run the next day, which was the greatest ceremony and sacrifice they could do for their god... [10]
>
> ...at the dawn, the rumble of voices, trumpets, bagpipes and sea shell trumpets was heard in the high mountains, showing that the Guatavita's faction was the first to bare, and from the Bogotá's side they went out in a great hurry to get to their assigned places, as decided by the Xeques and Mohanes. People covered the mountains and valleys, all running, as if to win a race.[11]

The value of this passage is key to understanding the Muisca calendar, and its importance was initially pointed out by López (2004) (priv. comm.). The date given to this event by Freyle (1636) was the year of 1538, the same year of the Spanish conquest, this being a clue that could help to correlate the Christian and Muisca calendars.

Unfortunately, according to the other chroniclers, this year is inconsistent with the probable time of the hostilities between the Bogota and Guatavita. In general, the accounts describe the events occurring under the rule of the Zipas *Saguanmachica, Nemequene, Tisquesusa* and *Sagipa*, the advent of the Spaniards being dur-

[10]"...La primera ceremonia que hicieron fue salir de ambos campos muy largos corros de hombres y mujeres danzando con sus instrumentos músicos, y como si entre ellos no hubiese habido rencor ni rastro de guerra. En aquella llanada que había entre los dos ríos que dividían los campos, con mucha fiesta y regocijo se mostraban los unos con los otros, convidándose, comiendo y bebiendo juntos en grandes borracheras que hicieron que duraban de día y de noche, a donde el que más incestos y fornicios hacía era más santo, vicio que hasta hoy les dura. Por tres días continuos dura esta fiesta y borracheras, y al cuarto día se juntaron los jeques y moanes, y acordaron que al siguiente día se comenzase a correr la tierra, que era la [fol. l0v] mayor ceremonia y sacrificio que hacían a su dios..." (Freyle, 1636, chap. IV:f9r)

[11]"...al romper de el alba se oyeron grandes vocerías en las cordrilleras altas con muchas tronpetillas, gaitas y fotutos, que demostraban cómo el campo de Guatavita era el primero que había sa- [fol. 11r] lido a la fiesta, con lo cual, en el de Bogotá no quedó hombre con hombre, porque salieron con gran priesa a ganar los puestos que les tocaban y estaban repartidos por los jeques y moanes; cubrían las gentes los montes y valles corriendo todos, como quien pretende ganar el palio..." (Freyle, 1636, chap. IV:f10v)

ing the Tisquesusa's rule. Piedrahita (1666), according to *the computation of moons that the natives do*[12] traces back the reign of Saguanmachica to 1470, Nemequene to 1494, and Tisquesusa to 1514. Sagipa would have taken the power in 1538, after the death of Tisquesusa, who was killed during the Spanish occupation. Chroniclers such as Simón (1625), Castellanos (1601), and Piedrahita (1666), all agree that to describe the enmity between the Bogotá and Guatavita goes back to the times of Saguanmachica, who rebeled against the Guatavita's control. The chroniclers described also how Nemequene subsequently defeated Guatavita and proceeded with an expansionist campaign against the Zaque of Tunja, conquering powerful cacicazgos loyal to the Zaque, such as the Cacicazgo of Turmequé. Nemequene was, however, killed during a battle against the Zaque forces, which caused the retreat of the Bogotá advance. Afterwards, Tisquesusa, Nemequene's nephew became the new Zipa, and prepared to renew the hostilities, although these plans were thwarted by the arrival of the Spaniards.

Freyre condensed this sequence of events into a very unlikely two-years timespan, may be because of a poor interpretation of the information. The chronicler admits having heard this story during his youth from a first-hand witness, Don Juan, the heir to the Cacicazgo of Guatavita, who in the times of the Spanish invasion was *fasting to succeed his uncle's lordship*[13]. Since Don Juan was old when he met Freyle[14], one could assume that his childhood was spent during the last years of the Nemequene rule, and may have been a direct or indirect witness of the battles against Bogotá, and perhaps participated in the ceremony (see figure 4.2). Therefore, by means of the Don Juan's testimony, Freyle describes the performance of a massive ceremony on the eve of the conquest, which we could link to the Ubaque one, and that had a religious-calendar nature.

[12]"...según el cómputo de lunas que hacen los naturales..." (Piedrahita, 1666, II: chap. 1)
[13]"...en el ayuno para la sucesión del señorío de su tío..." (Freyle, 1636)
[14]Juan Rodríguez Freyle was born in Santafé de Bogotá in 1566.

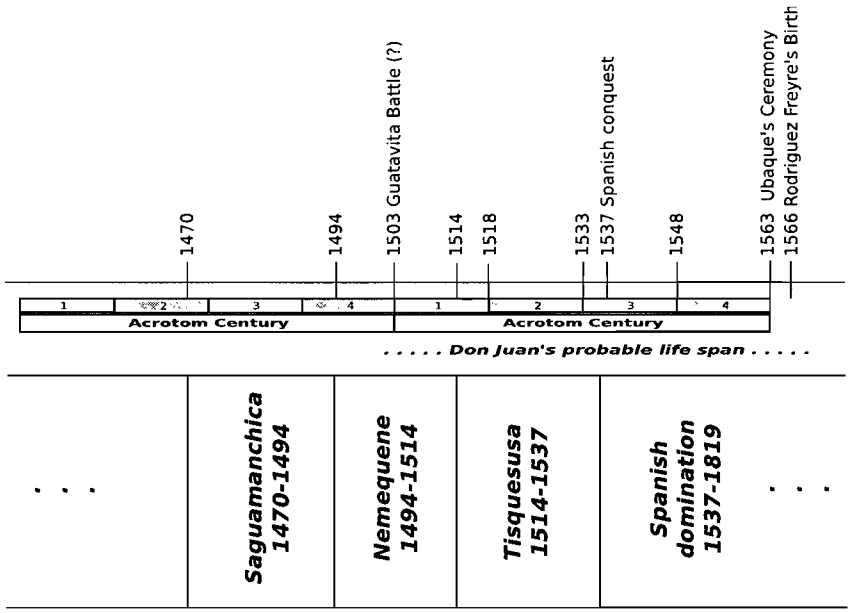


Figure 4.2: Time line of the Muisca's last history

4.3 The Duquesne's Acrotom Century and its matching with the Great Conjunction cycles

According to what was exposed in chapter 3, Father Duquesne argues that the Muisca's Acrotom Century had a span of approximately sixty years, which resembles the timespan of the cycle of Great Conjunctions, fact already noticed by researchers like Morales (2003). Hence, there is a possibility that the Muiscas did use the timespan of three consecutive conjunctions (sixty solar years), assimilating it as the Acrotom Century, and then splitting it in quarters of fifteen years (see page 65), each one marking the time to perform a religious celebrations. So, we could try to fit the Duquesne's model to the Muisca's chronology outlined, starting with the assumption that the Ubaque's ceremony of 1563 celebrated the end of a century. Thus, if such a century should have started sixty years before, in 1503, it should be divided in quarters corresponding to the years 1503, 1518, 1533, and 1548, these dates being the possible candidates for the perfomance of public

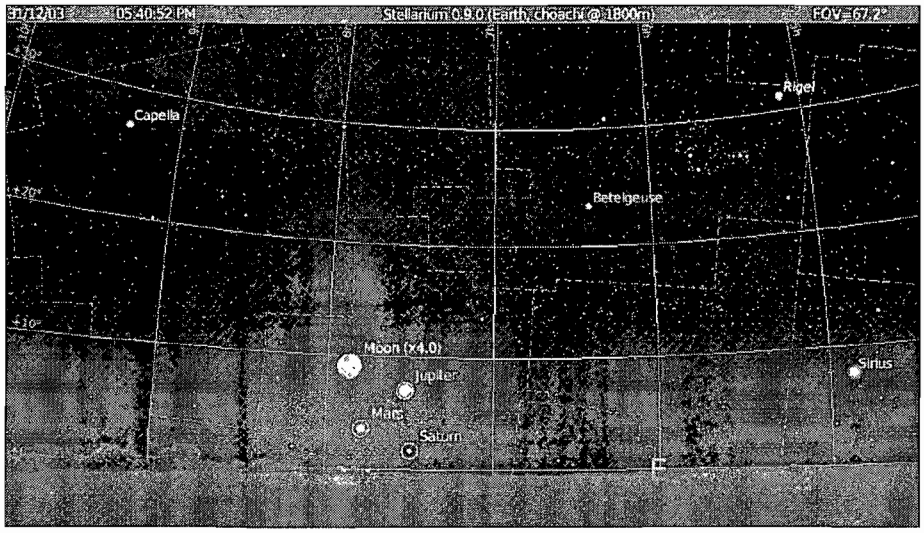


Figure 4.3: Simulation made in *Stellarium* (Chéreau et al., 2005) showing the Great Conjunction of 31 December 1503. The positions of Jupiter, Saturn, Mars and the Moon are shown as seen from the Ubaque's region, at 17:40, local time (daylight removed).

ceremonies.

So far, no historical record of ceremonies in 1548 exists, a fact which agrees with the declaration of the Ubaque witnesses, who only remember a similar ceremony before the "arrival of the Christians". Astronomically, both 1533 and 1503 are significant: the year 1533 marks the middle of that century, showing in December 31 the planets Jupiter and Saturn located in opposite places of the sky[15], having a rising azimut of 113° and 68° respectively, their rising points being near to the sunrise points during the solstices of June and December. In December 31 at 11:07am, the moon was in conjunction with Saturn, having an angular separation of 2.7°. In the year 1503, following the Great Conjunction cycle, Jupiter and Saturn were near in the sky, but interestingly, the planet Mars and the moon adjoined the conjunction during the month of December (figure 4.3). Again, on December 31, all three planets and the satellite had a mean angular separation of about 5.85° (see table 4.2).

[15]Jupiter, α: 18h 53m 5s, δ: -23° 2′ 3″; Saturn, α: 7h 35m 57s, δ: 21° 46′ 39″

	Moon	Jupiter	Saturn
Jupiter	5.3°		
Saturn	9.2°	5.3°	
Mars	5.5°	5.0°	4.8°

Table 4.2: Angular separation between Moon, Jupiter, Saturn and Mars during the conjunction of 31 December 1503

If the battle against Guatavita really happened during the rule of Nemequene, it seems probable that such a "Jubilee year", described by Freyle, could point to the Great Conjunction of 1503. In consequence, the Xeques' imposition of a truce was clearly justified in terms of the religious use of their calendar, forcing the sides to stop the war and attend together the ceremonies. Similarly, a (Muisca) century later, the same reason motivated the Muiscas to celebrate the end of the century, defying the Spanish control against the "native pagan traditions". If this is the case, we have evidence in the case of the Ubaque's ceremony and the Guatavita's battle that the Muiscas paid significant attention to the planetary phenomena, and its role determined the numerical elements of their calendar.

If the Acrotom Century is effectively bound to the span covered by three Great Conjunctions, a question arises: Why did they not celebrate all the conjunctions each twenty solar years (246 moons), and instead imposed ceremonies each fifteen solar years (185 moons), thus covering the span of three conjunctions? I believe the Muisca priests considered it important to fix the century in the series 1563, 1503, 1443, etcetera, because only during those Great Conjunctions the participating planets rose in a region of the horizon near to the sunrise point of the June solstice, which would have been significant to the native priests. The importance of the solstice's direction in the Muisca's use of the geographical space has been reported elsewhere (Dolmatoff, 1986; Izquierdo, 2000; Morales, 2003), and seems to be associated to the mythical route of Bochica across the territory (Morales, 2003).

Note that the hypothesis presented in this chapter comes from evidence that,

although precise, is yet incomplete. However, this gives us motivations to search for previously unrecognized clues in the historical sources, that lead us to complement our understanding of this issue. Hopefully, under Belmonte's classification of the archaeoastronomical work (see section 1.4), I consider these ideas strictly as *serious speculations*, and await for future data to contribute to their validation.

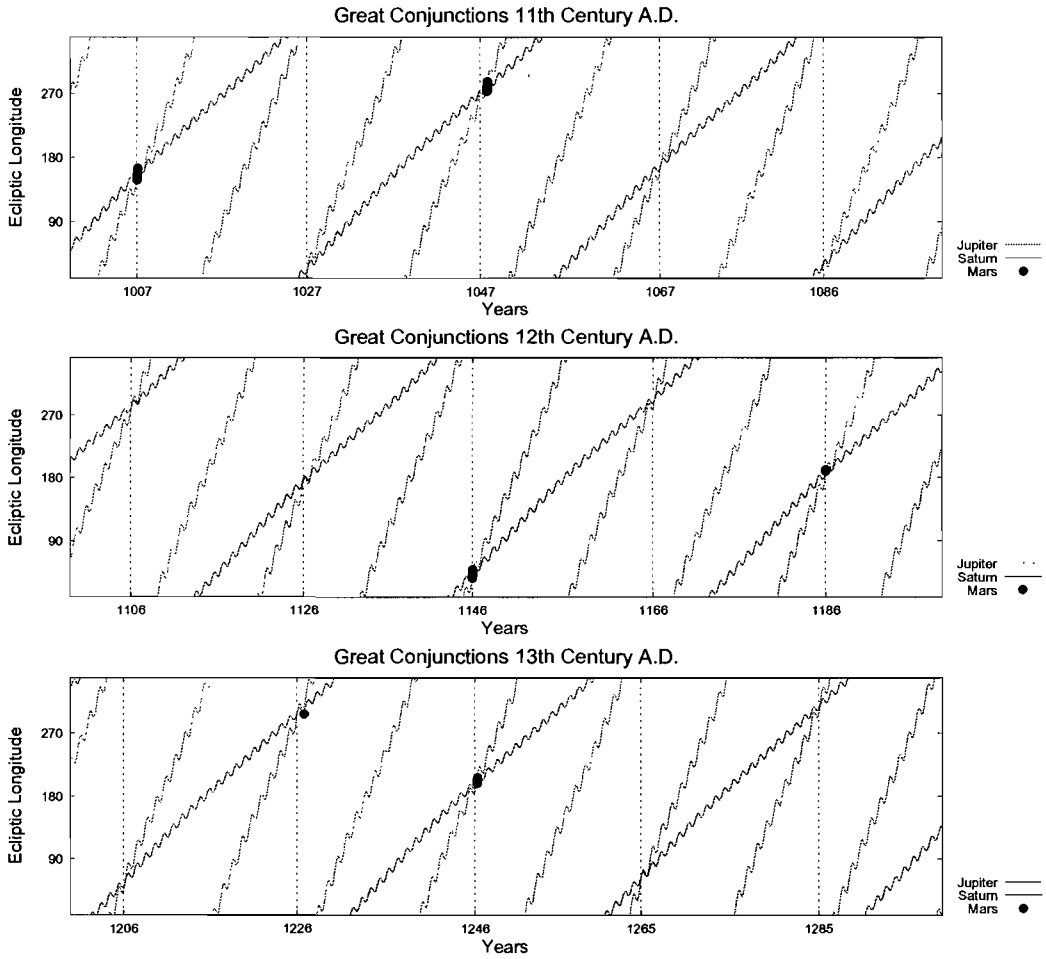


Figure 4.4: Great Conjunctions between 1000 A.D. and 1600 A.D.. The x-axis shows the years of each conjunction. Planet's locations (y-axis) are in ecliptic coordinates (longitude λ, expressed in degrees). Basically, any intersection of the ondulated lines corresponds to a close encounter of Jupiter and Saturn somewhere in the sky. The black spots correspond to the Mars' presence when it participates also in a Great Conjunction. The vertical dotted lines mark intervals of twenty solar years. *(continued in figure 4.5)*

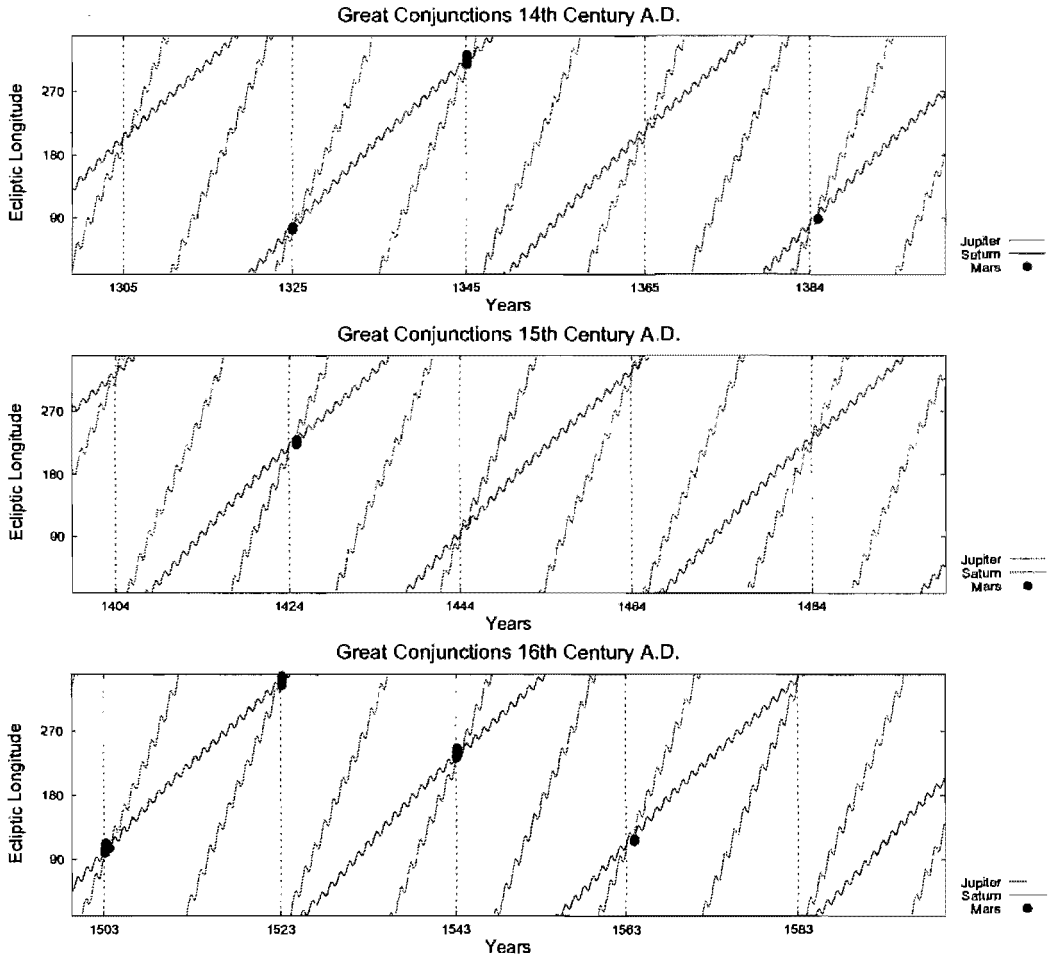


Figure 4.5: Great Conjunctions between 1000 A.D. and 1600 A.D. *(continuation of figure 4.4).*

Chapter 5

Archaeological artifacts associated to the calendar

5.1 The Duquesne's calendar stone

Father Duquesne, in the final parts of both the Astronomical Ring and the Dissertation, describes a small artifact of stone that he obtained from his indigenous informants and presumably contained calendar information (Humboldt, 1878; Zerda, 1882). This artifact was made on black stone and was irregularly pentagonal in shape, having nine carved figures distributed along its sides, most of them are described as iconographic variations of the toad and the snake (figure 5.1).

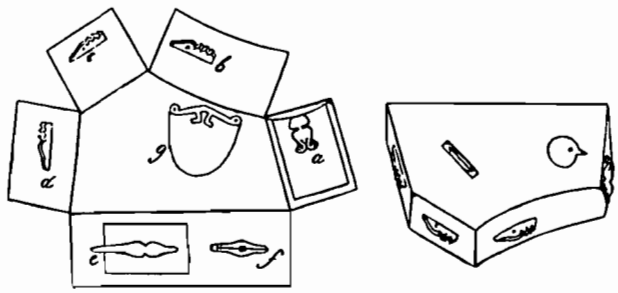


Figure 5.1: Stone described by Duquesne.

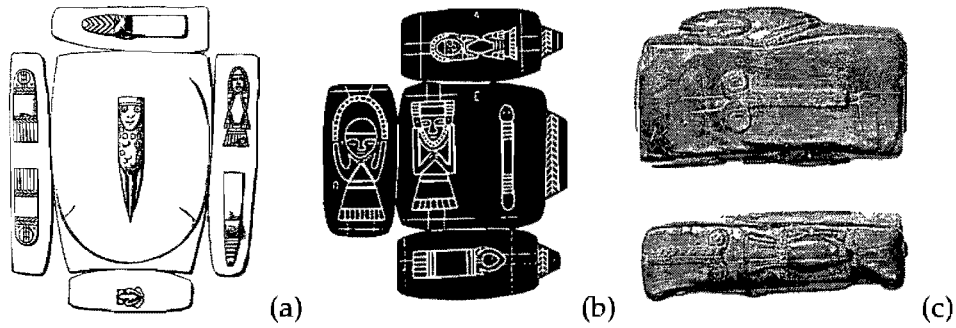


Figure 5.2: Muisca carved stones. (a) Stone described by Acosta (1848) (b) Stone described by Zerda (1882) (c) Stone of the Museo Nacional de Colombia's collection.

According to the clergyman's interpretation, this artifact was a representation of the sequence of 185 moons which composed the first Astronomical Revolution of the Acrotom Century. In an ingenious interpretation of its iconographic contents (see pages 130 and 163), Duquesne concludes that the five sides of the stone correspond to the five Acrotom years of such a Revolution. Furthermore, each one of the nine carved figures, are interpreted as the nine zocam years by a 185 moon span[1]. A set of four such stones — according Duquesne— should yield enough information to describe an entire Acrotom Century (Humboldt, 1878).

This interpretation of this stone artifact, has lead other scholars after Duquesne, (i.e. Acosta and Zerda, 1882), to publish similar descriptions of new stones found in both private and museum collections (figure 5.2). Interpreted under the lens of Duquesne's work, they are referred to as 'morphographic books' containing calendar information (Zerda, 1882).

However, two problematic aspects of Duquesne's approach arise: the first, is the fact that the clergyman's assignement of meanings to the iconographic motifs is subjective and difficult to corroborate. Essentially this is a case of *Endearing speculation* according Belmonte's classification of the archaeoastronomical research (see page 5). The second — and more convincing– aspect is that similar stone

[1]See the table of the appendix B, for the moon number 185, and note that such moon occurs during the nineth Zocam year from the start of the century.

Front side Back side

Figure 5.3: Muisca carved stone from Choachí (Cundinamarca). Museo Nacional de Colombia (ICAN42-VIII-3920)

artifacts as described by Duquesne, Acosta and Zerda, have been identified as moulds used by goldsmiths to mass-produce gold figurines (Long, 1989). This has minimized the credibility of the calendar-based interpretation of these stones, and consequently, the Muisca stone industry has been considered with skepticism regarding its calendrical and/or astronomical contents.

5.2 The Choachí Stone

Despite the apparent flaws in this part of the Duquesne's work, it is important to remark that not all the Muisca's lithic industry can be associated to goldsmith's tools, therefore it can be reconsidered, working under a less naive and more objective examination of its iconographic contents. If Duquesne elaborated his interpre-

tation of calendar stones based on ancient memories taken from his informers, this hypothesis must be supported by the existence of further objects in the available collections, with a clearly different use than as goldsmith tools and , which may provide more objetive calendrical information.

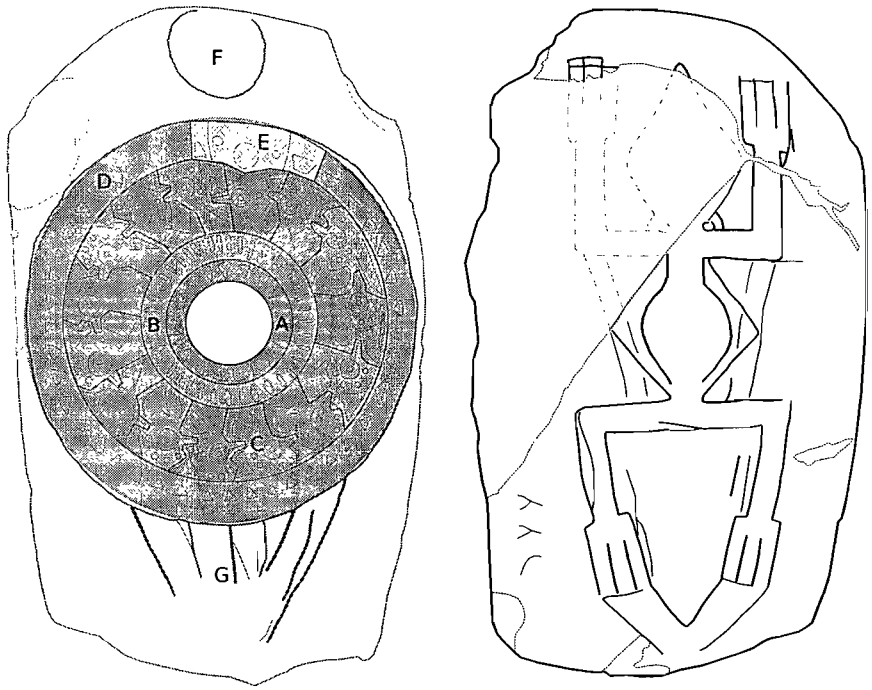
A highly plausible case of one of these artifacts is an archaeological piece belonging to the Museo Nacional de Colombia, (catalog number ICAN42-VIII-3920). It is a black (lidite) stone slab-shaped object whose dimensions measure $13 \times 7 \times 1.5$ cm (figure 5.3). Its two sides are polished bearing numerous figure carvings. It was acquired by the Instituto Colombiano de Antropología e Historia during the first half of the 20 century. Unfortunately, there is little information regarding its origin , except that is was found in Choachí, a village located at twenty kilometers to the southeast of Bogotá, possibly from a grave. Its back side bears a large fracture distorting about one third of its surface, which may be the result of careless violent extraction from its archaeological context. The front side is, however, undamaged and depicts an impressive set of carved figures ordered in concentric rings (see figure 5.4).

Unlike the stone described by Duquesne, the figures on this artifact provide more precise information, by depicting raw numerical values, which facilitates a safer and less subjective analysis of its contents and their relationship to the calendar model shown in this study.

5.3 Iconographic structure of the Choachí Stone

As illustrated in figure 5.4, the main iconographic components of this piece are in four concentric rings. In addition, some apparently isolated figures exist outside the rings. By labeling the rings with a series of letters, their contents are described:

First ring *(A)* Shows a series of 18 small triangles whose apex points towards the



Front Side Back Side

Figure 5.4: Structure of figures of the Choachí Stone.

center.

Second ring *(B)* Has a sequence of 40 lines, oriented towards the center.

Third ring *(C)* Shows a very complex set of 15 figures, each composed of a bird head like figure, surrounded by two irregularly shaped figures, the inner ones resemble a flag shape, the outer ones resemble triangles with a curved ending, and in some cases losing its triangular shape, becoming trapezoidal in form.

Fourth ring *(D)* and *(E)* Shows two sets of figures, a sequence of 37 triangles, similar to the ones of the first ring, and *(E)* depicts five figures that are, from right to left, a trapezium, a dot, a circle, a dot, and a triangle whose apex points away from the center.

Outside these rings, a semicircle *(F)* and five lines *(G)* starting from the bottom part of the main circle, extending themselves towards a center point of the bottom side of the stone. In the undamaged portion of the back side, there is a carved figure resembling a toad, with a V shaped carving at its feet that converges to the central bottom side of the stone.

5.3.1 Hypothesis about the Choachí Stone's Nature

Acrotom year association

In an initial observation, the 37 triangles of the fourth ring (D) appear to match the number of lunar months of the Acrotom year. This coincidence attracted my attention when I first examined this piece.

Zocam Centuries and Ata Cycle Association

Although less evident, than the fourth ring, the first and second ring (A) and (B) show numbers that permit associations with the Zocam Century, the Extended Zocam Century and/or the Ata Cycle. One possibility is to consider that the 40 lines of the second ring represent the number of Zocam years of a Zocam Century, 400 if each line had a value 10. Alternatively, if each line represents a set of 20 Zocam years, the ring correspond to 800 years, an Extended Zocam year.

Another possible connection can be seen if the set of 40 lines is considered to correspond with the 18 triangles of the first ring: $40 \times 18 = 720$. Note that this value corresponds to the moon just before the last moon of the Acrotom Century. Note also that such a number can be divided into the span of two Ata Cycles ($160 \times 2 = 320$) plus one Zocam Century: $320 + 400 = 720$. Therefore, 18 and 40 could be associated and expressed in terms of Ata Cycles and Zocam centuries. It is very unclear to infer how to fit this in the system shown by Duquesne, however,

I consider it may be a significant clue.

Another possible association of the number 18 is the same that is found in the mesoamerican calendars, where such a number results from the integer division of the number of days of a solar year (365) over months of 20 days. Albeit contemporary groups liguistically akin to the Muiscas, such as the Kogi, are known to use this formula to conform their calendar (Dolmatoff, 1950). However, there is no clear evidence suggesting the use of months defined this way by the Muiscas, who, according the historical accounts, had preferred a 30 day month (see section 3.3.5).

The numerical properties of the third ring's figures

These properties were first reported by Izquierdo and Morales (2006), who noticed that the bird head figures of the third ring may express additional numerical values. The bird-head motif is commonly found on ceremonial pottery and spindle whorls. It is also a common motif in most prehispanic cultures of the Intermediate Area (Falchetti, 1993; Warwick, 1997). Ethnographic analysis of another linguistically akin contemporary group known as the U'wa (Osborn, 1985, 1995) suggests that the image of the bird had an association to the seasonal movements of the sun, and hence time.

In the case of the Choachí stone, a graphical component of such motif, the feather crest, seems to be reused as a container of numerical information. Note the number of feathers (illustrated as dots) for each of the fifteen bird-headed figures of the Choachí stone is intentionally set, and is not a product of any aesthetic goal, representing a sequence composed of the values 4, 5, 6, 7 (figure 5.5). When read counterclockwise, the numerical values of these fifteen bird-head figures, yields the following sequence: 5, 5, 5, 5, 5, 5, 5, 7, 6, 6, 4, 4, 5, 4, 4.

What is the nature of such a sequence? What information is it providing? One may to consider that such sequence of natural numbers is being used to represent

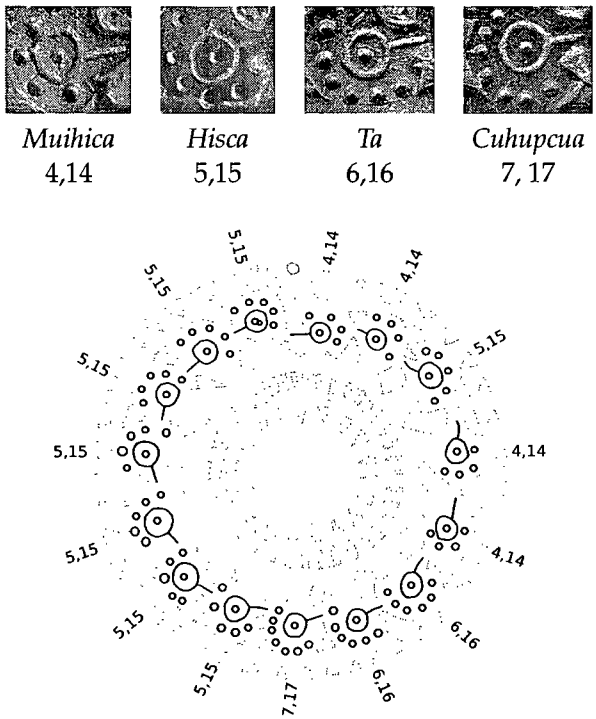


Figure 5.5: Numerical values for the bird-head figures

a real number by means of its average, in a similar fashion to the listings of number of days in the Maya codices. Note the average of the sequence is 5, and may suggest a special purpose of the number 5. Furthermore, considering the possibility that the circle-with-a-dot-and-a-line represents the head of each figure would have a similar use of the *quihicha* prefix, which would add ten to each value, the sequence could be restated as: 15, 15, 15, 15, 15, 15, 15, 17, 16, 14, 15, 14, 14, 14; whose average is 15 . This makes it even more interesting because it equals, the number of bird-head figures depicted in the third ring.

Synodic Lunar Period association of the third ring's figures

Subsets of the fifteen bird-heads figures whose sequence numbers can lead to values of astronomical significance: (14, 15, 15, 15), (17, 14, 14, 14), (16, 15, 14, 14). This gives each one a mean value of 14.75, which is approximately the value of

half lunar synodic period (Izquierdo and Morales, 2006).

Ata Cycle association of the third ring's figures

During the four years of an Ata cycle, the names of the years that finishes each year (before the supplemental series for the years 2,3,4), follows the following sequence: *Quihicha Cuhupcua, Quihicha Muihica, Quihicha Hisca, Quihicha Ta;* which could be rewritten as 17,14,15,16. Note these are the same numbers represented in the third ring (figure 5.5), which could support the association of the sequence of 15 bird-head numbers to the Ata Cycle.

An hypothesis regarding the use of the Choachí Stone

Based on the previous observations, and upon another interesting detail of this piece, its apparent ergonomics, the following hypothetical use could be proposed: the stone's shape and the way the figures were carved, makes this stone a suitable calculating tool, such that the user could have held the stone in hand, and using his thumb finger, could touch the different figures secuentially thus executing a given algorithm, until a numerical result is obtained. The Duquesne's description the performing of finger, calendrical computations (see chapter 3) could support the "pocket-calculator" hypothesis for the Choachí Stone. However, if this was really the use of this stone, new questions must be considered: What was this algorithm? What was it the expected outcame?, moreover, what data was needed to start the algorithm?

Even though this interpretation is somewhat speculative, it is clear that such numbers are not randomly chosen, rather they are intentional, serving the role of providing its owner with a tool to facilitate particular numerical. However, until additional archaeological and ethnohistorical evidence surfaces, this hypothesis should to be regarded as a plausible model, but only within the range of *Seri-*

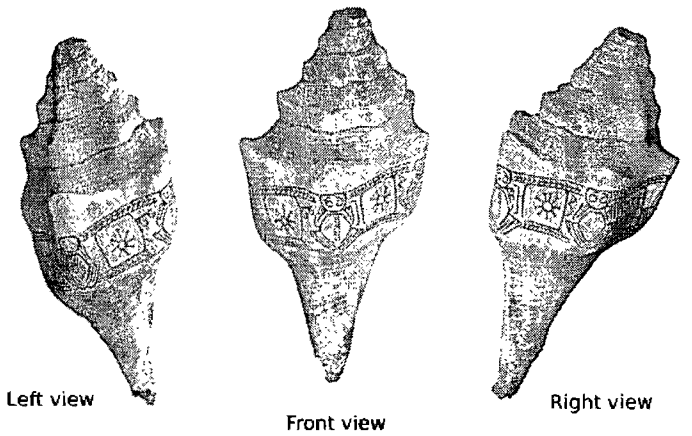


Figure 5.6: Conch shell bearing carved figures. From Museo Arqueológico de Sogamoso

ous/Endearing speculation.

5.4 Other artifacts to be considered by future research

An important detail of the Choachí stone is the probable reimplementation of the bird-head motif as a template to express numbers. Fortunately, there exist many archaeological artifacts depicting such a motif and deserves the attention of researchers. The analysis of which, could shed light on our understanding of the arithmetic and the calendar of the Muiscas.

5.4.1 The ceremonial conch of the Archaeological Museum of Sogamoso

This strombus conch shell was used as musical instrument (figure 5.6), and is part of the Archaeological Museum of Sogamoso's collection[2]. It was found by the archaeologist Eliecer Silva in the village of Socorro (department of Santander), and corresponds to the Guane; a culture which was a neighbor linguistically and cul-

[2]Catalogue number S068VI.

turally very similar to the Muiscas. The Guane also maintained close trade relations with the Muisca (Lleras and Langebaek, 1987). Strombus conchs were highly prized by the Muiscas, who used them to manufacture trumpets *(fotutos)*, and were played during the religious ceremonies. Such artifact probably arrived in Guane territory through trade between the two cultures.

This curious artifact bears a carved strip of nine red colored figures along its surface, depicting a sequence of four toad figures, five rounded squares, a circle surrounded with several radial lines in the center of each square. These figures have been illustrated with roman numbers I to XI (figure 5.7).

As with the case of the dots around the bird-head figures depicted in the Choachí Stone, the lines around the circles suggest the intention to express numerical values, being a possible variation of the bird-head theme of the Choachí Stone. With regards to the conch, the numbers 8 *(Suhusa)* and 9 *(Aca)* are alternated in the five circles of the strip (see sections labeled as I, III, V, VII, IX, in the figure 5.7).

A connection with the Muisca calendar can be proposed, on the basis of these numbers and Duquesne's etymological association for the number one and the toad. Therefore, it could be speculated that the four toads represent the number 1 *(Ata)* (see sections labeled as II, IV, VI, VIII, in the figure 5.7). An association with the calendar can be made when these numbers are compared with the name of the first month of each Acrotom year (including the supplemental series) of the Cycle of Ata (*Ata, Suhusa, Aca, Ubchihica/Gueta*, see appendix B), According to Duquesne, these names, were used by the Muiscas to coordinate the Cycle of Ata (see page 61). It is interesting to note that the central figure of the strip, the toad labeled as IV in the figure 5.7, bears two rows with 19 dots on its leading to the (possibility encoded) value of 20 *(Gueta)* based on the premise that: 1 *(the toad)* + 19 = 20. Consequently this conch could be a symbolic expression of the Cycle of Ata, incorporated in the decoration of a ceremonial intrument. Furthermore it has been

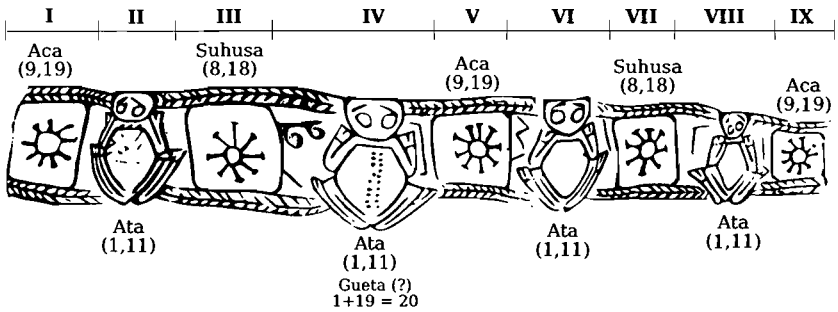


Figure 5.7: Numerical values of the conch of the Archaeological Museum of Sogamoso

noted that conch trumpets were used in the context of ceremonies associated to calendar events as described in the accounts of Spanish chroniclers (see chapter 4).

Although hypothesis may sound attractive, there remains some aspects not understood in this piece. For instance, the meaning of the groups of straight and curved lines drawn to in the space between of the figures III to IX, and the symbol inside the toad labeled as II, which today is obscure, depicting only tree dots in the upper part of the chest of the animal. Duquesne not only associated the toad with the one, but with nine and twenty, so why is the number nine not represented by a toad?. Until more evidence is made available, the interpretation of this piece has to be regarded as an *Endearing speculation*.

5.4.2 Spindle whorls

Another example of artifacts worth mentioning are the stone spindle whorls of the Muiscas. A remarkable feature of the Unlike other pre-columbian cultures that preferred to make their spindle whorls out of ceramics, the Muisca made theirs out of stone. A work aiming to classify these artifacts according their shape, size and decoration was undertaken by Silva (1985). The decoration on Muisca spindle whorls is highly geometrical, portraying a complex combination of motifs conformed by such geometrical primitives as straight and curve lines, spirals, circles, and triangles, representing both abstract and zoomorphic themes. A preliminary

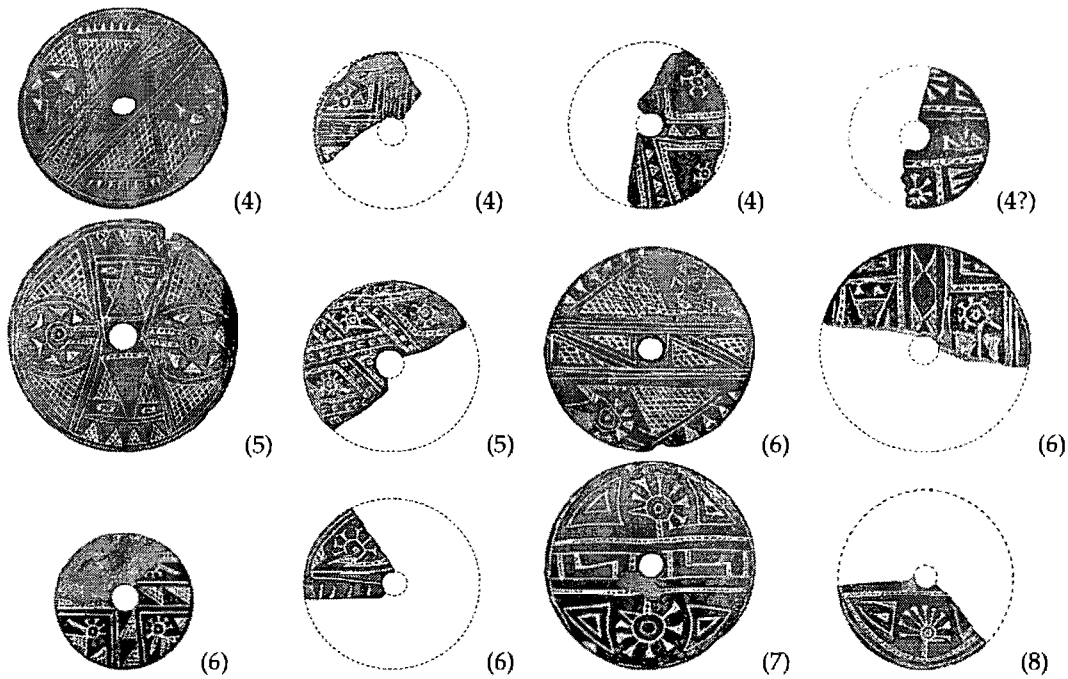


Figure 5.8: Spindle whorls of the Archaeological Museum of Sogamoso depicting the bird-head theme. The numerical value expressed in each bird head image is indicated in parenthesis at the bottom right of each example.

classification of such decoration was made by (García, 1971). A common decorative theme is the bird head, which apparently displays intentional variations in the number of feathers on its head. Figure 5.8 shows some examples of spindle whorls from the Archaeological Museum of Sogamoso's collection which bear this theme. It can be noted that the number of feathers on each bird's head ranges from 4 to 8, additionally, some style variations are noteworthy. For example the beak is omitted in some cases. However, it would be premature to argue the presence of calendar traits interpreted from numerical contents of spindle whorls. The arithmetic significance of bird head theme, seems to be only a small component of a larger pictorical system of representation, where it interacts with additional pictorical themes possibly related to diverse elements of the Muisca life. The complete analysis of the semantics of these decorations would require a whole new dissertation to itself, and lies beyond the scope of this project.

5.5 Nota bene

The aim of this chapter is not to assert the true meaning of the images appearing on the described artifacts, but to draw the attention of researchers to the possibility of a potential numerical representation schema in these objects. Such interpretation applied in conjuction with Duquesne's calendar model could yield clues in each other's interpretation. This project is intended to drive the examination of more artifacts, in order to confirm or refute interpretations regarding the existence of a numerical notation system as depicted in artifacts from this region, probably associated the Muisca calendar, as it has been suggested by the Choachí Stone this far.

Chapter 6

Concluding remarks

It could be said that the primary conclusion of this work is demonstrating that Father Duquesne's descriptive model is not product of his "imagination" as criticized by Vicente Restrepo. Rather, it is the product of an exercise in reflection regarding an authentic and legitimate timekeeping system, kept by oral tradition along three hundred years since the Spanish conquest by anonymous Muisca elders, a system that for Duquesne (and even, currently for us) was strange and curious. He intended to understand and describe such a system under the logic of the western calendars, and perhaps this made his work confuse and misunderstood by the next generation of scholars.

After completing the ardous task of compiling the data used in chapter 3, I began to recognize that the 'calendar' Duquesne interpreted was really part of a complex system of time cycles devised by the Xeques, which was based on a combination of astronomical cycles and arithmetic properties of 'propitious' numbers. The master of the esoteric use of such numbers via their arithmetic properties and their application to manage religious activities in function of the natural phenomena, which was likely a key component of Muisca religion. On one hand, they used the prime number 37, in order to condensate many astronomical cycles; on

the other, the numbers 20, and its factor 5, represented culturally determined values and were likely selected for anthropomorphic reasons. Derived from these are two constituent time cycles: one is the Acrotom Century, with its astronomical association with the Sun, Moon and planets; the other, the Cycle of Ata, its roots in the numeric-mystical traits of the Muisca religion. The aritmetically derived results from their propitious numbers will bring forth a mythical, temporal frame, where their civilizator hero can be located and hence, the foundations of their own culture lie. It seems likely that other cycles existed, based on other key numbers, which currently remain unknown. It is also important to say that not all these astro-arithmetical cycles had a direct agricultural application, and possibly the 'calendar' of Duquesne was a non agricultural component of the Muisca timekeeping system, aimed at measuring long time spans. This may explain why this system is unsuitable for agriculture, as previously noted by many other researchers (Rozo Gauta, 1997).

It can be argued that numbers contained further concepts beyond simple quantities for the Muisca, and embraced ideas related to the cyclical and celestial manifestations (as asterisms in the sky) of time. Thus, numbers are used to express the quantities, days, months, and years[1] as well as constellations. So numbers and all their arithmetic, astronomical and calendrical implications, can be understood as ideological artifacts manipulated by the Xeques, as devices to warrant their religious power.

This esoteric treatment of numbers, and their astronomical interpretations, are not, however, unique to the Musicas. Many prehispanic cultures of Mesoamerica based their calendar systems on elaborate numerical systems, used their properties to record large time spans, and operated over a mystical framework of their religion. This resembles the way the Muiscas designed their calendar, and in a

[1]See section 3.3.11 how the different years of the Cycle of Ata are named by a given numerical name.

sense, resemblances between the two systems are a difficult issue to deal with. The presence of twenty as a base of the numbering system, and the use of concurrent time series (or "calendar wheels" in Mesoamerican gargon), are indicators that knowledge of Mesoamerican arithmetic and timekeeping methods were known beyond the boundaries of the cultural realm of Mesoamerica. When describing aspects of the ancient Tairona culture[2], Tom Zuidema, addresses the issue in a direct way: "While these relations *[the ones with the Andes]* are rather general, connections with Mesoamerica are more specific. The Kogi calendar of eighteen months of twenty days each and their vigesimal system of counting, known also to the Tairona and the Muisca, could have been derived only from Mesoamerica, although applied to a non-Mesoamerican world. The Mesoamerican model may have reached more cultures in northern Colombia than we realize at present" (Zuidema, 1992).

Similarly, although less evident, similar elements akin to Andean Cultures are illustrated in the Muisca calendar. For instance, the 30 day lunar month was used in the Inca calendar (Zuidema, 1977; B. Bauer, 1995) as well as the practice of intercalating one month each three lunar years in order to synchronize the sun and moon as argued by Ziolkowski and Sadowski (1992) as a component of Inca astronomy. Furthermore, the significance of the movements of the planet Jupiter and Saturn in the Andean astronomy has been already suggested by Sullivan (1988). Similarly, the possible identification of 'dark constellations' by the Muiscas (see section 3.3.3) in the celestial background of the Milky Way is a trait clearly identified in both past and present Andean traditions (Urton, 1981b).

As a primary conjecture, it can be argued that when the Muiscas developed their own calendrical system, they eclectically incorporated concepts from the astronomical and arithmetic traditions of the main cultural centers of America,

[2]Contemporary to the Muiscas and Chibcha speakers also. Located on the northern coast of Colombia, their descendants are the current Kogi culture.

developed before the emergence of Muisca Culture in the east-central highlands of Colombia during the 9th century AD. This is clearly demonstrated by in the insistence, to use lunar months (Andes) as base units of the 'calendar rounds' (Mesoamerica), which compose the Cycle of Ata and the Acrotom Century of the Muisca system. Such an eclectic approach, could have been useful in terms of dealing with some lunar periods. For example, Zuidema (1977) argued that the Incas used a lunar year of 328 days based on the sidereal[3] period of the Moon ($27\frac{1}{3}$ days), opposed to the sinodical one[4]. Perhaps the Muiscas would have been aware of such a system of calculation, because it is notewhorthy to see that by combining this period with the Mesoamerican twenty, by multiplication yields a timespan of 6560 days, which falls roughly into the fifth day of the moon number 222 of the Acrotom Century (see table of appendix B). Interestingly, this month marks the end of the Acrotom year six of that century. Another equally interesting association is that the next month (the 223, the first of the seventh Acrotom year), will start on 6585.3213, which matches the Cycle of Saros[5], of 18 solar years and 11 days, exactly. This makes such a cycle very easy to track within the Muisca framework, every six Acrotom years. It is difficult to determine if the Muisca were actually aware of these astronomical cycles. However, any Muisca priest, dealing experimentally with lunar phenomena, would soon discover that the eclectic choice of Mesoamerican and Andean calendrical concepts would permit the tabulation such phenomena in a simple and elegant way.

The mechanisms, which allowed the Muiscas to profit from the calendrical concepts of Mesoamerica and the Andes and develop their own by extension, represent an unexplored and uncharted territory. Such issues involve the detailed study of the trade networks operating in the prehispanic America from north to south,

[3]The duration of the Moon's return to the same point in the sky, relative to the background stars.
[4]The time between two identical lunar phases.
[5]Cycle wherein two identical eclipses are produced.

transferring knowledge and ideas, as well as material goods.

Appendix A

Duquesne's works

A.1 Dissertation

DISERTACIÓN SOBRE EL CALENDARIO DE LOS MUYSCAS, INDIOS NATURALES DE ESTE NUEVO REINO DE GRANADA. DEDICADA AL S. D. D. JOSÉ CELESTINO DE MUTIS, DIRECTOR GENERAL DE LA EXPEDICIÓN BOTANICA POR S. M.

POR

EL D. D. JOSÉ DOMINGO DUQUESNE DE LA MADRID, CURA DE LA IGLESIA DE GACHANCIPÁ DE LOS MISMOS INDIOS. AÑO DE 1795

Calendario de los Muyscas, Indios naturales del Nuevo Reino de Granada.

Una de las cosas que han hecho más honor a las artes y ciencias es el estudio de las antigüedades. Por este medio se han penetrado algunos secretos escondidos, se han descifrado varios misterios, y se ha ilustrado en una gran parte la historia. No contentos los doctos anticuarios con las lápidas sepulcrales é inscripciones de sus países, han procurado desenterrar a Menfis, y los viajes a Egipto han enriquecido al orbe literario con sus descubrimientos.

La América no puede hacer ostentación de estas magnificas antigüedades. Por más que se haya pretendido que Sesostris extendió sus conquistas hasta estos remotos fines de la tierra, no encontraremos en ella los trofeos de sus victorias que dejó en el Asia. No hallaremos obeliscos con que adornar nuestras ciudades, laberintos, ruinas de edificios, medias columnas, pirámides, cuyos lados tengamos que medir, para describir sus fachadas, ni otros monumentos que en si mismos conservan, a pesar de su ruina, no sé que aire de magnificencia en cuyo prólijo registro se emplea con gusto la curiosidad.

Los fragmentos históricos de estas partes son tan sencillos como sus primeros pobladores. Pero, aunque no se encuentre entre éstas gentes el fausto de los antiguos Egipcios, se ven sus misterios. No hallamos monumentos Faraónicos, pero si algunos pequeños trozos de los fundamentos sobre que se edificaron. Hablo de los hieroglíficos que se han encontrado entre los Indios. Esta palabra griega quiere

decir: imágenes ó figuras sagradas. Dióse este nombre a aquellas de que se servían los Egipcios para representar los dogmas de su teología, o de su ciencia moral y política, que se veían esculpidas sobre piedras, pirámides, etc.

Las pinturas de los Indios son puramente simbólicas; se insistió poco sobre ellas en aquellos tiempos en que pudieron haberse examinado. Nada penetramos de los caracteres de los Egipcios, y los que tenemos de los Indios no pueden explicarse. Así estas dos naciones que poseyeron, o, por decir, cultivaron más bien que otras los símbolos y caracteres primitivos de que nació el uso de las letras, se han hecho igualmente célebres e ininteligibles, sirviendo ya más estos sus monumentos para atormentar los ingenios que para adelantar la erudición.

Como quiera que sea, la antigua América no ha dejado de hacer alguna ostentación de sus pinturas simbólicas entre los eruditos. Pero la nación de los Muyscas, Indios del Nuevo Reino de Granada, no ha podido entrar hasta ahora a la parte de esta pequeña gloria. El Padre Torquemada se queja de la negligencia de las primeras personas de letras que entraron en esta tierra. El señor Piedrahita abiertamente pronuncia que ignoraron estos indios los hieroglíficos, y los quipus de los Peruanos; lo cual es falso, como se convence de muchos fragmentos que nos han quedado de su antigua superstición.

Tengo pues el honor de servir a la historia con un nuevo descubrimiento, y de exponer el año y siglo de los Muyscas; interpretando los signos que lo contienen, y que hemos hallado por propia investigación. Esta interpretación esta fundada en el conocimiento de sus costumbres, de su historia, de su idolatría y de su lengua. Esta ultima, así como me ha sido de mucho auxilio, me ha dado también mucho trabajo, porque ya no se habla este idioma, y me ha sido necesario sacarlo de entre los cartapacios en que se halla reducido al método de la lengua latina, con quien no tiene analogía, para restituirlo a su verdadero principio, formándolo como de nuevo sobre el genio de las lenguas orientales para investigar las raíces y deducir

las etimologías.

Los Muyscas contaban por los dedos. Solo tienen nombres propios para diez, y para el número veinte. A saber: Ata, Bosa, Mica, Muyhica, Hisca, Ta, Cuhupcua, Suhuza, Aca, Ubchihica, Gueta. En concluyendo con una vuelta de las manos, pasaban a los pies, repitiendo los mismos nombres, a que anteponían la palabra Quihicha, que quiere decir el pié, Quihicha ata, once: Quihicha bosa, doce, etc.

El número 20, expresado por la dicción gueta (casa y sementera), en que se encerraban todos los bienes y felicidad de esta nación, fenecía todas sus cuentas. Y así en terminando con un 20, pasaban a contar otro, uniéndolo con el primero hasta formar un veinte de veintes.

De modo que, así como los matemáticos han dado al círculo 360 grados, por la facilidad con que este número se subdivide en otros menores para formar cualquiera cálculo, así ellos dividían sus cuentas en cuatro partes tomadas de la misma naturaleza, partiéndolas de cinco en cinco. Y así sus números más privilegiados eran: 5, 10, 15, 20, de los cuales se servían en el arreglo de todos sus negocios.

La luna era el objeto de sus observaciones y de sus cultos. Este astro, de que no apartaban los ojos, les dio el modelo de sus casas, cercados, templos, labranzas, en una palabra de todas sus cosas. Fijaban en el suelo un palo de que hacían centro, y con una cuerda trazaban el círculo. Este palo, y la cuerda, si se consideran bien los caracteres o símbolos que hemos descrito en la tabla, se conocerá que son los principales elementos sobre que se hallan formados. Los diferentes significados que tienen estas voces numerales en su lengua, todos son alusivos a las fases de la luna, a las labores de sus sementeras, y a las supersticiones de su idolatría, y así nos conducen derechamente a la formación de un calendario.

Tenían los indios colocados en las manos mentalmente estos símbolos, a manera que los músicos los signos del sistema de Aretino. Y así, con solo dar una vuelta a los dedos, sabían el estado de la luna y el gobierno de sus cosas v de sus

sementeras.

El año constaba de veinte lunas, y el siglo de veinte años; comenzaban a contar el mes desde la oposición o plenilunio figurado en Ubchihica, que significa luna brillante; contando siete días en los dedos comenzando por Ata, que se sigue a Ubchihica, hallaban la cuadratura en Cuhupcua; contando de allí siete encontraban la próxima inmersión de la luna en Muyhica, que significa cosa negra, y al día siguiente la conjunción simbolizada en Hisca, que en su concepto era una unión de la luna con el sol, que representaba las nupcias de estos dos astros, que era el dogma capital de su creencia, y el objeto de sus mas execrables cultos; contando después ocho días hallaban la otra cuadratura en Mica, que significa cosa varia, como queriendo significar la perpetua variación de sus fases. El primer aspecto de la primera faz la señalaban en Cuhupcua, y como en este símbolo caía la cuadratura le daban dos orejas, y le llamaban sordo por otros motivos de superstición.

Estos mismos símbolos servían a contar los años, y contenían una doctrina general, en orden a la siembra, Ata, pues, y Aca, representaban las aguas en el Sapo. El mas frecuente graznido de este animal les sirvió de señal para conocer que se acercaba el tiempo de sembrar.

Bosa: una sementera que hacían alrededor de la principal para defender el centro de los daños.

Mica: buscar, hallar, escoger cosas menudas: significa la elección que debían hacer de las semillas para la siembra.

Muyhica: cosa negra: representa el tiempo tempestuoso y oscuro. Su raíz significa crecer las plantas, porque con el beneficio de las aguas toma cuerpo la sementera.

Hisca: cosa verde: con las lluvias aparece el campo hermoso y alegre. También significa holgarse. Las plantas mas crecidas los alegraban con la esperanza

de los frutos.

Ta: Sementera: al sexto mes de la siembra corresponde la cosecha.

Cuhupcua: sus graneros tienen la figura de caracol o de oreja. Cuhutana, que tiene la misma raíz, significa los rincones de la casa donde depositan los granos: alude a la cosecha.

Suhuza: cola, rabo: mes que viene al fin de las siembras. Tiene alusión al palo de sus calzadas, donde hacían sus solemnidades verificada la cosecha.

Ubchihica puede aludir a sus convites.

Gueta: casa, y sementera. Esta marcado con un sapo tendido, que entre ellos era el símbolo de la felicidad.

Los indios miraban estos avisos como otros tantos oráculos: enseñaban a sus hijos con tesón esta doctrina de sus mayores, y, no contentos con estas precauciones, para no perder el gobierno del año lo señalaban con la sangre de muchas víctimas.

No decían jamás esta palabra: Zocam (el año) solo, sino con el número que le correspondía, Zocam Ata, Zocam Bosa, etc. Lo mismo ejecutaban con la palabra Suna (la calzada), en donde hacían en cada siembra y cosecha sus mogigangas y sacrificios, Suna Ata, Suna Bosa, una calzada, dos calzadas. Y de este modo estos lugares eran como un libro donde se iban registrando las cuentas.

Veinte lunas, pues, hacían el año. Terminadas estas, contaban otras veinte, y así sucesivamente, rodando en un círculo continuo hasta concluir un veinte de veintes. La intercalación de una luna, que es necesario hacer después de la luna trigésima sexta, para que el año lunar corresponda al año solar. Y se guarde la regularidad de las estaciones la ejecutaban con suma facilidad. Porque, como tenían en las manos todo el calendario, sembraban dos sementeras seguidas con un signo

de por medio, y la tercera con dos. Como sobre este principio rueda toda su astronomía, idolatría, política, economía, u lo que ahora nos es más interesante, su iconografía, es necesario expresarlo con mayor individuación.

Distribuyamos pues los signos muyscos en los dedos, y esta tabla digita nos dará todas las combinaciones. Supongamos que Ata, que esta en el primer dedo, corresponde a enero, y que es un mes apto para sembrar. Corridos los dedos corresponde la segunda sementera en Mica, interceptando a Bosa, que esta en medio de Ata, y Mica. De suerte que esta sementera se hace en la luna decima tercia respecto de Ata.

Corriendo ahora los dedos desde Mica, corresponde la sementera en Hisca, interceptando a Muyhica, que esta en medio de Mica, é Hisca. De modo que se hace la sementera en la luna décima tercia respecto de Mica.

Corramos últimamente los dedos desde Hisca, y se hará la sementera en Suhuza, interceptando dos signos: Ta y Cuhupcua, que están en medio de Hisca y Suhuza; esto es en la luna décima cuarta respecto de Hisca.

Esta luna Cuhupcua (que en su lengua quiere decir sorda) es la que se intercala, por que es la décima séptima al año segundo muysco, cuyo número, añadido a las veinte lunas del año primero, produce 37, con lo que queda igualado el año lunar con el solar, y Suhuza viene a ser un verdadero enero.

Esta intercalación, que se verifica perpetuamente, dejando pasar como inoficiosa o como sorda la luna 37, nos hace concebir que dentro de los dos años vulgares, de veinte lunas cada uno, hay otro año astronómico oculto que consta de 37 lunas, de modo que la luna 38 sera un verdadero enero. Los Indios, sin penetrar la teórica de esta proposición, que ha sido embarazosa en otras naciones más cultas, por esta luna que ha sido necesario añadir al fin de cada tres años lunares por ser los doce anteriores de doce lunas, y el tercero de trece, tenían suma facilidad en la práctica de su intercalación, siguiendo el método propuesto, conservándose así el

año astronómico, sin que el pueblo notase diferencia alguna en sus años vulgares de veinte lunas cada uno.

El año vulgar de veinte lunas servía para las treguas en la guerra, como consta de su historia, para las compras y ventas, y otros negocios de la sociedad. Pero el año astronómico é intercalar de 37 lunas, que se contaba por tres sementeras, servía principalmente a la agricultura y a la religión; y así llevaban su cuenta con mucha prolijidad los xeques, y mayores a quienes correspondía, notando sus épocas con sacrificios mas particulares, y grabándolas también en piedras, por medio de símbolos y figuras, como se ve en un pentágono que tengo en mi poder y voy a explicar al fin de este papel.

El siglo pues de los Muyscas constaba de veinte años intercalares de 37 lunas cada uno, que corresponden a 60 años nuestros, y le componían de cuatro revoluciones contadas de cinco en cinco, cada una de las cuales constaba de diez años muyscos, y quince nuestros, hasta completar los veinte, en que el signo Ata vuelve a tomar el turno de donde comenzó la vez primera. La primera revolución se cerraba en Hisca, la segunda en Ubchihica, la tercera en Quihicha Hisca y la cuarta en Gueta.

La inteligencia de estos calculos es tan necesaria para penetrar su historia antigua, y descifrar sus símbolos y figuras, que sin ella no pueden comprenderse, y así nos ha sido indispensable formar una tabla cronológico-muisca, en que fácilmente se percibe toda la economía de su siglo, que ponemos al fin con la debida explicación.

La semana era de tres días, y estaba señalada con un mercado que hacían cada primer día de ella en Turmequé, de los mas ricos y opulentos, como se puede ver en el Padre Zamora.

Dividían el día Sua, y la noche Za, desde el oriente al medio día Suamena, la mañana; desde el medio día al ocaso, Suameca, la tarde; del ocaso al fin de los

crepúsculos (hacían la comida), Zasca, prima noche: de la media noche (se levantan al mayor trabajo) a la aurora, Cagui. De la aurora (almuerzan) al oriente (Así esta.)

El fundador de los Muyscas no quizo dejar el calendario, por fácil que fuese su ejecución, al arbitrio del pueblo. Mandó que se consultase a sus jefes, y esta providencia paso con el tiempo a superstición. Llegaron a persuadirse que obtenían estos el imperio de las estrellas, y que eran dueños absolutos de los tiempos favorables o adversos y aún de todas las miserias y calamidades que afligen al hombre. Nada pues se hacia sin su consejo, y sin que recibiesen por él muchos donativos, y así no hubo pueblo en donde se vendiesen más caros los almanaques.

Tenían, a más de eso, el cuidado de señalar las revoluciones del año con las cosas más notables. No había siembra ni cosecha sin sacrificio. Tenían en cada pueblo una calzada ancha y nivelada que salía del cercado, o casa del cacique, y corría como por media legua, rematando en un palo labrado en figura de una gavia de que prendían al miserable cautivo que ofrecían al sol y a la luna para obtener una cosecha abundante.

Venían en mogiganga los indios, repartidos en diferentes cuadrillas, adornados de muchas joyas, lunas y medias lunas de oro: disfrazados unos con pieles de osos, tigres y leones; enmascarados otros con máscaras de oro, y lágrimas bien retratadas, a los cuales seguían otros con mucha gritería y risadas, bailando y brincando con descompasados movimientos: otros traían unas grandes y largas colas, que iban pisando los que los seguían, y llegando al término de la calzada disparaban todos sus flechas y tiraderas al infeliz cautivo matándole con larga muerte, y, recibiendo su sangre en diferentes vasijas, terminaban la barbara función con sus acostumbradas borracheras.

Nuestros historiadores se admiran mucho del fausto y de la extravagancia de estas procesiones, pero nos dieron una idea muy diminuta, refiriendo por mayor sus cuadrillas. En lo poco que describieron se conoce que esta mogiganga era un

símbolo de su calendario, y, si las hubiesen dibujado todas, nos ayudarían a formar el concepto de sus signos, y de los caracteres que les atribuyan.

Pero la víctima destinada a solemnizar las cuatro lunas intercalares que partían el siglo, estaba señalada con muchas circunstancias. Era este un miserable mancebo, que precisamente había de ser natural de cierto pueblo, sito en los llanos que llamamos hoy de San Juan. Horadábanle las orejas, le criaban desde mediano en el templo del sol; en llegando a diez años nuestros, le sacaban para pasearle, en memoria de las peregrinaciones del Bochica su fundador, a quien se figuraban colocado en el sol, y continuando, en un matrimonio feliz con la luna, una lucidísima descendencia. Vendíanle en precio muy alto, y era depositado en el templo del sol hasta cumplir quince años nuestros, en cuya precisa edad hacían el bárbaro sacrificio, sacándole vivo el corazón y las entrañas para ofrecerlas al sol.

A este mozo le llamaban Guesa, esto es sin casa, por lo dicho. Llamabanle tambien Quihica, que quiere decir puerta, con la misma alusión que los Romanos llamaron Jano al principio del año. Significa también boca, porque llevaba la voz de su nación para hablar de cerca a la luna intercalar y sorda que no oía desde acá abajo sus lamentos. Esta gente ilusa se figuraba que sus víctimas le hablaban por ellos dentro de su misma casa, y por eso hacían muchos sacrificios de loros, pericos y guacamayos; y solían matar hasta doscientos en cada vez de estos animales. mas no llegaban a las aras sin haber aprendido la lengua. Pero, por muchos sacrificios que hiciesen, la luna intercalar y sorda proseguía de la misma suerte en todos sus turnos, sin que se alterase el calendario. Los pericos y guacamayos hacían desde luego en tanto número una terrible algazara. Et sequitur cursus surda Diana suos.

Las muchas precauciones que tomo el legislador para el gobierno del año hicieron a los Muyscas demasiadamente atentos a su observancia. Mirábanle como un invento divino, y a su autor como un Dios que habitaba en las mismas estrellas. Colocaron pues al Bochica en el sol, ya su mujer Chia en la luna, para que contin-

uasen desde allí una protección benéfica sobre su descendencia.

A éste su Bochica daban dos compañeros, o hermanos, a que simbolizaban de un cuerpo con tres cabezas, porque decían que tenían un corazón y una alma. Entre tanto el Bochica les dirigía desde el sol sus sementeras. (Véase una imagen de Endimion, de quien afirma Plinio que paso una gran parte de su vida en la contemplación de la luna. De donde nació la fabula de que estaba enamorado de ella.)

Tuvo también su lugar entre los astros el Sapo, para acompañar al Escorpión, y a los demás animales de los Egipcios. Jamás ha dado esta sabandija mayor brinco del charco al cielo, y nunca bajó el hombre más del cielo al cieno, y de la altura de los astros, a quienes domina por su sabiduría, a la bajeza de la más profunda ignorancia en que es dominado de todas las pasiones. Por este pequeño rasgo se conoce la uniformidad de los progresos de la idolatría en todas las naciones del mundo.

No contentos con haber divinizado a su legislador formaron otra divinidad de uno de sus héroes sobre el mismo calendario. Fue este el portentoso Tomagata, uno de sus mas antiguos Zaques. En vez de tejer su historia, haremos su retrato. Tenia un ojo solo, porque era tuerto; pero este defecto lo suplían las orejas, porque tenia cuatro, y una cola muy larga a manera de león, o tigre, que le arrastraba por el suelo. Fué fortuna de la miserable nación que fuese impotente, porque no se multiplicasen los monstruos. El sol lo había despojado de la potencia generativa la noche anterior a su matrimonio, para que le heredase su hermano Tutasua. Fué lastima que no fuese cojo, porque era, decían, tan ligero que todas las noches hacia diez viajes de ida, y otros tantos de vuelta, a Sogamoso, que dista ocho leguas de Tunja, visitando todas sus hermitas. Vivió cien años, y los Muyscas pretendieron hacerle vivir muchos mas. Sus facultades se median por sus defectos, pues tenia del sol el poder de convertir en culebra, tigre, lagarto, etc., a cualquiera que lo irri-

tase. Los indios le llamaban el cacique rabón. Su nombre Tomagata, significa fuego que hierve. Ellos pasaron al cielo astrológico este espantoso cometa, y yo, según las circunstancias de su historia, creo que le señalarían mas bien por eunuco de la Virgen Espigadora que por compañero de Sagitario.

Tal fué el cielo de los Muyscas, lleno de animales como el de los Egipcios. En él vemos introducidos al Bochica y a Chía sus fundadores, como en aquel a Osiris é Isis: las trasformaciones de aquellos en el carnero, en el toro, y en otros animales celestes, se ven igualmente imitadas, entre estas gentes, en las trasformaciones de Tomagata, é que aludían las de sus cuadrillas. Se ve también una gran conformidad entre los signos de los Egipcios y los símbolos de los Indios. No pretendemos que los caracteres de que hoy usamos en la astronomía sean los mismos originales que inventaron los antiguos: pero todos conocen que retienen alguna semejanza de los elementos sobre que se formaron. Como también que los Egipcios no fueron sus primeros inventores, habiéndose propagado desde el valle de Senaar, junto con los primeros conocimientos astronómicos. Pero los Egipcios y los Indios. que son descendientes de Can en la más probable opinión, como aquellos, cultivaron la escritura simbólica. con mas aplicación que otras naciones, hasta hacerla propia.

Ata: es un sapo en acción de brincar. que caracteriza bien la entrada del año. Aca: es otro sapo de cuya cola se empieza a formar otro; símbolo de aquella luna en que observaban la generación de estos animales, cuyos frecuentes graznidos anunciaban las próximas aguas, y eran la señal de acercarse sus siembras. Por donde se conoce la alusión que hace al signo de Piscis. Gueta: es un sapo tendido; significa la abundancia y la felicidad. A otros signos dieron facciones humanas, de donde parece ha llegado hasta nosotros el uso de pintar el sol y la luna con ojos y narices. Bosa: representa unas narices. Mica: dos ojos abiertos. Muyhica dos ojos cerrados. Cuhupcua: dos orejas. Ubchihica: una oreja. Verisímilmente quisieron dar a entender las diversas fases de la luna, y abusaron después por erradas aplica-

ciones. Cuhupcua: tiene también la idea de una canasta, para significar la cosecha. Ta, Suhuza: figuran el palo y la cuerda con que formaban el círculo de sus casas y de sus labranzas. Hisca: la unión de dos figuras. Era símbolo de la fecundidad; y se conoce la alusión que hace a Géminis. En sus significados, que son varios, se nota también la conformidad con los antíguos, y que esta doctrina de los tiempos, la recibieron los Indios como las demás naciones al tiempo de la dispersión de las gentes.

Hemos visto el calendario muysca en los dedos; también le gravaban en piedras por medio de sus figuras simbólicas. Mantengo en mi poder una que lo expresa según mi modo de pensar, y tengo el honor de servir a la historia con este nuevo descubrimiento. En este reino ninguno ha pensado hasta ahora en trabajar sobre la iconografía de los Muyscas, y así estos pequeños rasgos son los primeros elementos de este genero en que tanto se interesa la historia. El Sapo es indubitablemente el símbolo de la primera luna del año y del siglo. Pusieronle los Indios entre sus divinidades, y le dibujaban de distintas maneras. En acción de brincar correspondía al primer signo, Ata, y así se halla grabado en varias piedras. He notado en otras que esta grabado con rabo o cola, lo que me ha hecho pensar que en esta acción caracteriza a Quihicha ata, esto es al número 12. Porque, continuando el brinco para denotar los meses futuros, señala con la cola los que deja detrás. Símbolo que en otros animales usaron los antiguos, y que representaban estos mismos en las cuadrillas de sus procesiones, de que hemos hablado. Observando varias piedras con la debida atención, he notado que figuran también el cuerpo del sapo sin patas, lo que me representa el signo de Gueta, o también un signo en quietud, sin que influya en las operaciones del campo. Algunas veces la cabeza del sapo se ve unida a la cabeza de hombre: otras el cuerpo sin patas trasformado en ídolo: esto es con una vestidura o túnica propia de hombre: y asimismo el sapo de cola y sin patas de que hemos hablado.

Supuesto este corto número de observaciones porque carecemos de otros monumentos sobre que hacerlas, explicaré la piedra, que se ve dibujada en la figura 1. Es un pentágono, señalado con las letras a. b. c. d.

a. es un sapo sobre un plano en acción de brincar. b. es una especie de dedo señalado de tres líneas gruesas. c. es lo mismo, pero se debe notar que esta fuera del centro o línea que siguen los otros. d. es lo mismo conservando el centro del primero. e. es el cuerpo de un sapo, con cola, y sin patas, sobre un piano. f. es una culebrilla, g. es un círculo en el plano de la piedra en cuyo segmento se ve la figura H. Y. es el reverso del plano de la misma piedra. L. es un círculo con dos segmentos formados por una cuerda y un radio. M. es una culebra, etc.

INTERPRETACIÓN

Esta simbolizada en esta piedra la primera revolución del siglo muysca, que comienza en Ata, y acaba en Hisca, el cual incluye nueve años y cinco lunas muyscas. Los Indios, que para todo usan del círculo, aquí prefieren el pentágono para significar que hablan de cinco años intercalares.

a. El sapo en acción de brincar: principio del año y del siglo. b. Esta especie de dedo señala en las tres lineas gruesas tres años. Omitiendo pues el dedo c., que está a un lado, cuento en el dedo d. otros tres años, que, juntos con los del dedo b., producen seis. Lo cual denota la intercalación de Quihicha ata, que sucede puntualmente a los seis años muyscas, como se ve en la tabla; y es de mucha consideración entre los Indios, por pertenecer al sapo que regla todo el calendario.

e. es el cuerpo de un sapo de cola y sin patas. Símbolo de Quihicha ata, y por carecer de patas figura muy propia para expresar su intercalación. Porque el mes intercalar no se computa para la sementera, y así lo imaginaban sin acción y sin movimiento. Se ve sobre un plano, como también el sapo Ata, lo que conduce a significar que en una y otra parte se habla del sapo.

f. Esta culebrilla representa el signo Suhuza, que es el que se intercala después de Quihicha ata a los dos años muyscas representados en las dos líneas gruesas que tiene en el dorso. Lo que corresponde al año octavo, como se ve en la tabla.

Como concluimos con los lados del pentágono pasamos al plano i. La culebra m es una reproducción de Suhuza y como esta tendida sobre una especie de triángulo símbolo de Hisca, significa que se intercala inmediatamente después de Suhuza al segundo año, lo que esta figurado igualmente en las dos líneas gruesas que tiene en el dorso.

Como el fin principal de esta piedra cronológica es señalar la intercalación del signo de Hisca, por ser el término de la primera revolución del siglo muysca, para mayor claridad están contados estos años en los tres dedos; conviene a saber: b, c, d., que juntos producen nueve años, que son los que dan puntualmente esta notable intercalación, que sucede a los nueve años y cinco meses como se ve en la tabla.

g. es un templo cerrado. h. es una cerradura que hasta el día de hoy usan algunos indios, y llaman candado cormo. Los agujeros de las dos orejas sirven a las estacas que le ponen, y los dos ganchos interiores a asegurar la puerta. Significa la primera revolución del siglo, cerrada en Hisca, y para que continuase el tiempo era necesario en su imaginación que el Guesa abriese la puerta con el sacrificio de que hemos hablado, y cuyas circunstancias eran simbólicas, relativas a estas revoluciones del siglo.

La culebra, por otra parte, ha sido un símbolo del tiempo en todas las naciones. Esta primera revolución de siglo estaba consagrada principalmente a las nupcias del sol y la luna, simbolizadas en el triángulo, no sólo según los Indios, sino según otras naciones.

EXPLICACIÓN DE LA TABLA DE LOS AÑOS MUYSCAS.

El círculo interior representa las veinte lunas del año muysco vulgar, cuyos

signos todos se intercalan en el espacio del siglo.

El círculo segundo expresa los años muyscas a que corresponde la intercalación de cada signo.

El círculo tercero expresa el orden de esta intercalación; ejemplo: deseo saber en que año muysco se intercala el signo Mica. Veo en la tabla el número 3 en el círculo interior, hallo en el segundo que le corresponde el número 30[1]*, y este es el año que se busca; veo en el siguiente círculo que le corresponde el número 19, y así la intercalación de Mica es en orden la décima nona del siglo.*

La intercalación de Gueta (20) es la ultima del año muysco 37. Esto es después de un siglo vulgar muysco de años 20 lunas, y más 17 años, de suerte que, terminando el siglo, o revolución astronómica de 20 años intercalares de 37 lunas cada uno, les faltan tres años vulgares para completar dos siglos vulgares. En llegando pues a este caso no hacían más cuenta de aquellos tres años vulgares de que no necesitaban para la labranza, ni para la religión, ni para la historia, y empezaban en Ata (a que había llegado el turno) un año vulgar, nuevo principio de un siglo nuevo en todo semejante al primero que hemos descrito.

[1]There is a typesetting error in the Acosta's text. Instead 30 it should be 36.

LAMINA 1ª

Fig. 1.

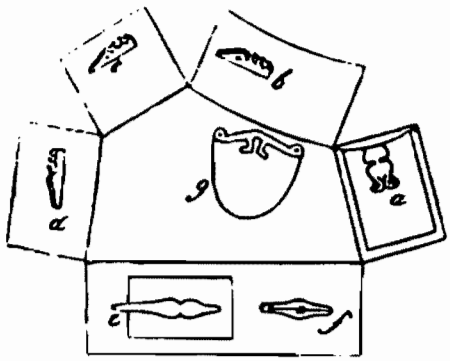


Fig. 2.

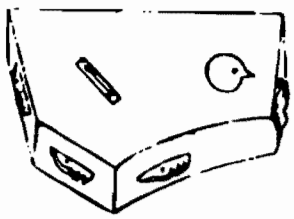


Fig. 3.

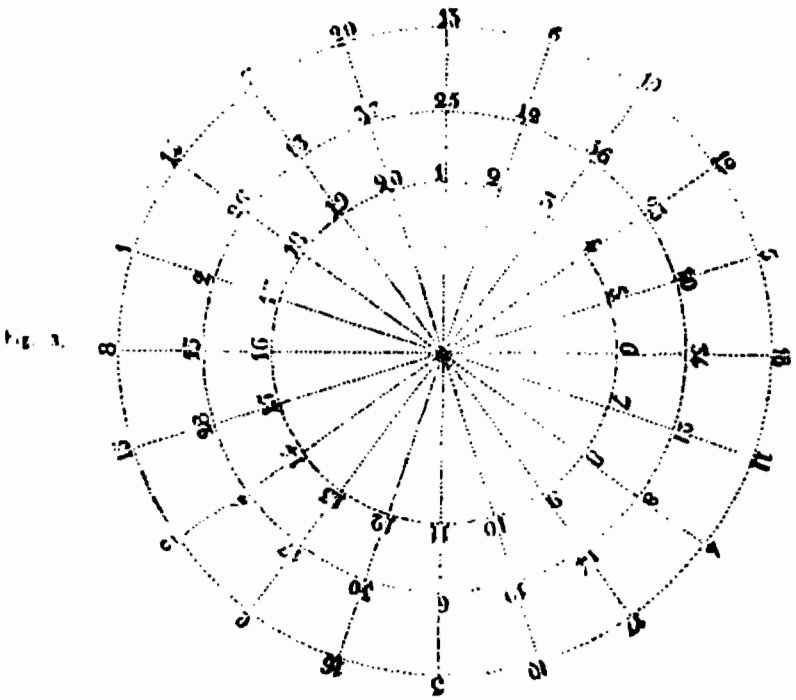
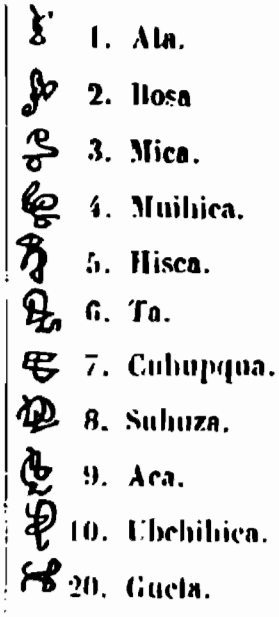


Fig. 4.



1. Ala.
2. Hosa
3. Mica.
4. Muihica.
5. Hisca.
6. Ta.
7. Cuhupqua.
8. Suhuza.
9. Aca.
10. Ubehihica.
20. Guela.

A.2 Astronomical Ring

DISERTACION SOBRE EL ORIGEN DEL CALENDARIO JEROGLÍFICO DE LOS MOSCAS

(Por el Doctor José Domingo Duquesne. 1795).

El calendario de los moscas es una pieza original; los indios atribuían esta invención al Bochica su fundador, y sirve de prueba el haber fundado sobre esta misma idea toda su religión y todas sus costumbres, mirándole no sólo como una tabla astronómica para el computo de los tiempos sino como un cuerpo de legislación de ritos y ceremonias para el gobierno de la nación. En efecto, el Bochica puso en planta su calendario en las tierras de que se posesionó, pero traía la idea de otra parte, y debemos pensar que la había recibido en aquella misma escuela en que cursaron juntos todos los hombres.

Nada hay tan natural como creer que los hijos de Noé extendidos en las vastas llanuras de Senaar, convinieron entre sí en algunos reglamentos cómodos para medir el tiempo arreglando por ellos las operaciones de la labranza y los negocios de la sociedad. La medida mas sencilla de que pudieron servirse fué la luna, así por sus revoluciones periódicas como por la notable diversidad de sus fases, a las cuales podían ligar sus diferentes ideas, para sus juntas, sacrificios, estaciones, teniendo todos en el cielo un libro público por donde gobernarse con la mayor seguridad.

Yo no pienso en detenerme en probar una verdad que ya otros han establecido con sólidos fundamentos; pero que habiendo hallado los padres de todas las naciones reunidos por bastante tiempo bajo un jefe, en unos mismos intereses y ceremonias, es constante que de esta misma fuente bebieron todos aquellos primeros elementos en que después se han visto convenir todos los pueblos del orbe.

Si conviniéramos en esta idea, daríamos una salida fácil a muchas cuestiones embarazosas que han atormentado los ingenios que se han querido fatigar voluntariamente. No habría necesidad de hacer paralelos entre los egipcios o los fenicios y los indios para buscar en aquellos como en su fuente los símbolos de que usaron

éstos para hacerlos sus descendientes. No habría que buscar las libaciones, purificaciones y sacrificios ya entre estas gentes o las otras, para pretender que los indios habían copiado de otros estas o semejantes costumbres.

Conviniendo en ciertos usos que fueron comunes a los primeros maestros del orbe, nos desembarazaríamos de estas dificultades. Entre tanto no pienso, como he dicho en detenerme en probar una verdad tan bien establecida, pero me serviré de ella para ilustrar el argumento que tratamos, por la cual se conocerá el fondo o política de estos primeros habitantes.

A la verdad todos recibieron de Noé las primeras lecciones de astronomía. Todos se conformaron en el gobierno del año, y al principio fue para todos el curso de la luna la regla general de los tiempos. Esta luna intercalar, tan necesaria para arreglar el movimiento de este astro con el sol, fue conocida de todas las naciones. y aunque se pueda pretender que debieron este conocimiento a sus propias posteriores observaciones, los calendarios de América prueban que no les fue desconocida a sus primeros pobladores, los cuales fueron al mismo tiempo mas cuidadosos en conservar estos primeros elementos que los otros tal vez despreciaron.

Si cotejamos el calendario de los moscas con los que usaron las naciones del mundo antiguo, hallaremos que este es una pieza original que en nada se les parece sin embargo de haber tenido todos un mismo principio. La idea no puede ser mas singular, a excepción de la luna intercalar que es un principio común sobre que ruedan todos. ¡Qué artificio! ¡Qué invención tan nueva y rara conservar sin añadir ni quitar ninguna luna, la adición de aquella luna tan extraordinaria que se les hizo dificultosa de entender con el tiempo a los otros, y que hubieron de abandonarla o confundirla con vergonzosa ignorancia aun aquellos pueblos que han sido reputados por mas políticos y sagaces! ¡Cuantas veces perdieron el hilo! ¡Cuantas pretendieron hallarlo de nuevo! Entre tanto los moscas usaron de las reglas de sus mayores por tantos siglos, sin tener que variar jamás el primer méto-

do que recibieron. Siempre lograron sus cosechas, siempre tuvieron bien conocidas sus respectivas estaciones, siempre conservaron el orden de su cronología en aquella parte que necesitaron, y aún con toda la larga carrera de sus años se hubiera hallado arreglada tal vez de algún modo, si se hubiesen descubierto sus quipus que ocultaron, y con que llevaban una cuenta tan sencilla como segura en todos los negocios que consideraban de alguna importancia.

Si echamos una ojeada sobre el mundo antiguo, apenas se encontrará en toda la antigüedad cosa de significación más variada que el año. Casi no se puede creer que haya habido gentes que hayan tenido por año una luna, si no fuese igualmente cierto que hubo quienes le tuvieron de un día solo. Los egipcios, según Plinio, tenían el año de una luna; los arcades de cuatro. Los indios habían ya logrado, por su plan de medir el tiempo, muchas cosechas, cuando los caldeos, no se sabe cómo se gobernaban, ignorándose de qué manera computaban los padres de la astronomía. Pasando de aquellos tiempos más oscuros a otros más conocidos, los romanos desde su primera fundación nos presentan un calendario de diez meses muy artificioso; no hay cosa más especiosa que su primera fachada: las calendas, las nonas, los idus, son unos nombres de mucha idea, pero que importa si le dejaron en la parte sustancial tan imperfecto, que el pueblo mismo, según dice Macrobio, añadía al fin de los diez meses tantos números de días cuantos eran menester para que el principio del año coincidiese con la primavera, sin dar a este tiempo nombre especial de mes, lo que puso a Numa en la necesidad de ajustarlo. Con todo, o por defecto de calculo o por política, quedo tan defectuoso, que fue preciso que Julio César basase el año sobre un plan enteramente nuevo, que es el que nosotros hemos adoptado.

En orden a los hebreos no se sabe qué género de año usaron en los tiempos antiquísimos; creen algunos que hayan sido solares. Según los diferentes estados del miserable pueblo, unas veces siguieron a los egipcios, otras a los caldeos y a

los persas, y finalmente a los griegos. Estos se gobernaban para el año por el sol, y por la luna para los meses. En los libros de Moisés, solo un mes, que es Abib, se designa con su propio nombre, los demás tienen el de primero, segundo, etc.

Cuando este pueblo se hallo en su libertad, uso de años de doce lunas y, al tercero de trece. Este plan nos recuerda la primera forma de aquellos arios antiguos del tiempo de Noé, cuya tradición es muy natural que guardasen. Como quiera que sea, los moscas, entre todas las gentes, no tuvieron alteraciones ni variaciones en el gobierno del año; su fundador lo arreglo sobre el pie que recibieron de los hijos de Noé todos los hombres cuando, la tierra era de un solo labio; y cuando tuvo una lengua distinta le acomodo según sus ideas y el genio de su idioma, en los términos en que lo hemos explicado, dándole tanta regularidad, y tomando tantas precauciones, que aseguró su perpetuidad por largos siglos entre sus hijos; estos contribuyeron, por su parte, a su conservación; pero, convertida la observancia en superstición, y entendiendo siniestramente la doctrina de su legislador, mancharon con feos borrones una de las piezas mas finas y memorables que nos han quedado de aquella respetable antigüedad.

Los jeroglíficos tuvieron a mi ver el mismo principio que los calendarios; los egipcios cultivaron con tanto empeño los símbolos, que han pasado por inventores de ellos, entre muchos eruditos. Los monumentos faraónicos que ellos levantaron en los tiempos de su mayor opulencia, contribuyeron en una gran parte a ponerlos en posesión de esta gloria. Pero si atendemos al uso que hicieron los indios de los caracteres y pinturas simbólicas, nos veremos precisados a darles un origen más antiguo, y le habremos de buscar entre los primeros hombres; éstos, así como escogieron la luna para medir por ella los tiempos, señalaron también sus fases con ciertas figuras alusivas a las facciones humanas, las cuales fueron, en mi modo de pensar, el fundamento no solo de todos los símbolos sino de todas las letras. Así como con el curso de la escritura fueron declinando los rasgos de la pluma o

del estilo hacia unas u otras formas, de la misma manera vario el pincel las lineas de los jeroglíficos, según el genio y gusto de las gentes.

Si se cotejan los jeroglíficos y cifras de los moscas ya con los signos de los meses de los egipcios, ya con varias letras asiáticas, se hallara toda la conformidad y analogía que es necesaria para establecer este pensamiento; Libra es una oreja, como la de ubchihica; Leo y Pisis, son el mica y muihica de los indios, y asi de otros. La medheoris, yet, thet, sirlaco y muchas otras letras asiáticas tienen una grande afinidad con estos caracteres.

Yo no decido sobre estas materias, someto mi juicio al de los eruditos, y me contento solo con este pequeño descubrimiento, que si merece la aprobación de los doctos, podrá contribuir de algún modo o dar alguna mayor luz a varios lugares oscuros de la historia.

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ANILLO ASTRONÓMICO DE LOS MOSCAS

Por el doctor Don José Domingo Duquesne de la Madrid.

1795

I - DE LOS JEROGLÍFICOS

Hieroglíphicos, según las dos palabras griegas que componen esta dicción quiere decir imagen o figura grabada. Diose este nombre a aquellas de que se servían los egipcios para representar los dogmas de su teología o las máximas de su ciencia moral y política que se veían esculpidas sobre piedras, pirámides, etc. No hubo rasgo o carácter entre estos indios gentiles, que no mirase alguno de estos objetos, y principalmente al primero; y así se cegó voluntariamente Walton para despreciar los símbolos mexicanos, conociéndose que no los entendió, en el mismo ejemplo que puso para rebatirlos.

Las pinturas de los indios algunas veces eran una pura escritura, explicaban sus pensamientos con imágenes, y faltando imágenes, con caracteres. En el padre García se puede ver un ejemplo de la confesión de los peruanos. Pero nuestros autores no explicaron los dichos caracteres ni nos han dado una lamina de ellos, en lo cual ha perdido mucho la historia. Los egipcios nos dejaron sus representaciones jeroglíficas en sus pirámides, los indios en sus diferentes piedras, pero los caracteres de éstos no se entendieron y se perdió el antiguo alfabeto de aquéllos, y de esta suerte estas dos naciones que cultivaron tanto los símbolos, se han hecho igualmente célebres y oscuras, y así sus monumentos sirven mas para atormentar los ingenios que para adelantar la erudición.

Pero todo esto que se admiró en los peruanos fue común a los moscas. Aunque muchas de las figuras simbólicas están tan enterradas, como las noticias de sus historias, no deja de haber algunas descubiertas por donde pueda cualquiera certificarse de esta verdad. Todavía se encuentran algunas piedras con animales graba-

dos y distinguidas con lineas, ángulos, triángulos, etc. Se conservan algunas pinturas de colores en piedras expuestas al sol y al aire. que no ha podido borrar el tiempo, y entre otras, una muy particular de que habla el padre Zamora por estas palabras, tratando de una imagen que se halla en el pueblo de Guasca: "Tiene barbas, sandalias y un libro en la mano; y a sus pies cinco renglones de caracteres tan incógnitos que no se ha podido entender su significado. Están a su lado dos compañeros con el mismo género de vestido".

No es mi asunto la iconología de los moscas, si hubiese de hablar de sus diferentes imágenes, ya las que representan sus dioses, ya las que simbolizan a sus héroes, y son lo mismo que los manes de los antiguos, ya las que eran únicamente un voto u ofrenda que contenía la petición que hacían a sus númenes, me desviaría de mi principal argumento. Pero me ha sido preciso recordar o afirmar estas noticias para que a su vista se hagan memorables los jeroglíficos que voy a dar, y en cuya explicación se conocerá mejor el genio, las costumbres, la idolatría y el gobierno civil y político de los moscas.

II - DE LOS NÚMEROS

Los moscas contaban por los dedos, esto significa el verbo zegitisuca, cuya raiz es igiti, el dedo. Solo tienen nombres propios para diez, en concluyendo con ellos pasaban de las manos a los pies, anteponiendo a cada uno la palabra quihicha, que significa el pie: quihicha ata, el uno del pie u once; quihicha bosa, doce, etc.

El número 20, expresado por la palabra gueta, casa y sementera, en que encerraban todos los bienes y felicidades de esta nación, era un total completo que cerraba todas las cuentas. Concluido un 20 pasaban a otro, que parece de la misma especie, al que llamaban gueta bosa, dos veintes; gueta mica, tres veintes, y de esta manera unían los unos con los otros hasta completar un veinte de veintes, y así en lo demás. Estos mismos números empleaban en sus medidas: iana, el palmo, que era la menor, y pcuacua, la brazada que era la mayor, y para el suelo se gobernaban

por el paso, gata, al que regulaban por la misma numeración, encerrándose en esto toda la aritmética que necesitaban para su comercio, agricultura, casas, labranzas, etc.

Los años pasados, meses, etc., los contaban para atrás como se ve en la tabla. El año presente corresponde a ata, el segundo a bosa, el tercero a mica, etc. y con el número 20 llenaban grandes espacios de tiempo en el uso de su cronología. Los números cardinales: lo primero, lo segundo, etc., quihina, corresponden en la tabla a los numerales.

Cuando denunciaban la guerra asistían por 20 días seguidos en el campo, cantando y alegrándose con la esperanza de la victoria, y si perdían la batalla permanecían en el mismo campo otros 20 días llorando y lamentando su negra y desdichada fortuna. Se dice que el zipa Nemequene y el zaque Michua ajustaron una solemne tregua de 20 lunas; y que el misterioso sueño de su memorable Bochica duro en su fantasía veinte veces cinco veintes de años, todo lo cual nos confirma en la idea de su modo de contar que llevamos insinuado, para que no se juzgue que procedemos voluntariamente en estas imputaciones.

No solo tenían los moscas nombres para sus números, sino también guarismos para expresarlos. Descubrimiento también nuevo y correlativo a los símbolos. Tengo el gusto de servir al lector con una tabla de estas cifras que verosímilmente son las mismas que usaban los peruanos y de que solo nos había quedado una generalísima y confusa noticia que nos suministra el padre García por estas palabras: "Suelen pintar los indios del Perú la confesión de todos sus pecados, pintando cada uno de los diez mandamientos por cierto modo, y luego allí haciendo ciertas señales como cifras que significan los pecados que han hecho contra aquel mandamiento".

Este cierto modo y estas ciertas señales son las que hemos descubierto. Son, pues, estas cifras unos compendios de los símbolos, de los cuales cada uno vale

uno de los números a que corresponde. El método que tenían de llevar estas cuentas es el siguiente; representaban, por ejemplo, diez sujetos que debían una determinada cantidad, en diez lineas, y al pie de la linea ponían la cantidad pagada, por donde se conocía lo que quedaba restando, hasta enterar todo el débito que quedaba señalado con el carácter correspondiente a gueta, que en esta su aritmética es (según parece) no solo 20, sino una cifra igual a cualesquiera totales, Estos caracteres, en mi modo de pensar, ilustran mucho la historia como veremos adelante.

III - ORIGEN DE LOS NUMEROS

El círculo fue la figura mas usada de los moscas; daban esta figura a los cercados y palacios de los zipas y zaques, a sus casas particulares, a sus labranzas, a sus templos, en una palabra, a todas sus cosas. Fijaban en la tierra un palo, de que hacian centro, y con una cuerda describían alrededor el círculo.

Este parece haber sido el origen de los números: como entre ellos la casa y la labranza hacían todos sus bienes, el círculo con que describían uno y otro, fue la medida más propia para expresarlas. Abstascua significa dar esta vuelta y sus dos raíces tienen una significación muy apropiada. Abos. alrededor, y bta, volver a otra cosa, y así de estas dos palabras formaron los dos primeros números (ata-bosa), porque concluyendo con una vuelta de los dedos, tenían que volver a otra, y como en las mismas manos tenían una imagen o representación del círculo, pareció esto lo mas natural y propio para explicarlo. Pero así estos números como los demás tienen otras significaciones muy acomodadas a todos los objetos a que los aplicaban.

Los símbolos tienen los mismos nombres de los números, pero aplicados a los meses; su representación es la siguiente:

1  *Ata. Los bienes — otra cosa.*

Ata: Un sapo en acción de brincar, que caracteriza la entrada del año.

2  *Bosa: Alrededor.*

Bosa: Unas narices y las dos ventanas.

3  *Mica. Parar, hallar, abrir, buscar, coger, cosa varia.*

Mica: Dos ojos abiertos y las narices.

4  *Muihica. Piedra de la casa, cosa negra, crecer.*

Muihica: Dos ojos cerrados.

5  *Hisca. Cosa verde. Alegría, echarse uno sobre otro, medicina.*

Hisca: Unión de 2 fig.: símbolo de fecundidad.

6  *Ta. Labranza, cosecha.*

Ta: El palo y la cuerda: con que formaban el círculo de sus casas y de sus labranzas.

7  *Cuhupcua. Sordo.*

Cuhupcua: Las dos orejas tapadas.

8  *Suhusa. No tirar de otra cosa. La raíz significa tender, extender.*

Suhusa: El palo y la cuerda.

9  *Aca. Los bienes.*

Aca: sapo de cuya cola principia a formarse otro.

10  *Ubchihica. Luna resplandeciente, casa pintada, Pintar.*

Ubchihica: Oreja, significa las fases de la luna.

20  *Gueta. Casa y sementera, tocar.*

Gueta: Un sapo extendido o echado.

En estos nombres puede notarse la alusión que tienen los números con las letras de algunos orientales (que entre ellos son numerales), que son significativas y tomadas en una gran parte de los bienes, casas y sentidos del hombre.

Estas figuras son dirigidas a expresar los meses y el año, cuya artificiosa distribución esta simbolizada en estos aspectos, como vamos a exponer con la mayor claridad.

IV - AÑO DE LOS MOSCAS

Sin embargo de estar asistidos de las dos mayores luces, el sol y la luna, entramos en una provincia muy oscura. Habiendo puesto Dios estas dos grandes lumbreras en el cielo para que todos los hombres pudiesen computar por ellas los días, las noches, los meses y los años, entramos con ellas a registrar las profundas y lóbregas cavernas de la idolatría de esta nación y sus mas remotas antigüedades. No nos ha quedado otro medio, porque los autores que escribieron en el tiempo de su descubrimiento, no nos dieron noticia alguna fija en orden al año. Retrocederemos, pues, a aquella edad, caminando con tiento sobre algunas huellas y vestigios que han quedado aun estampados sobre sus labranzas, y el método que guardaban algunos sobre el tiempo de las siembras, junto con otras noticias ya generales, ya particulares, que nos pondrán en estado de conocer su antiguo año con la mayor seguridad.

En efecto, el año que voy a dar de los moscas, es una pieza completa y estoy perfectamente asegurado en orden a todo lo que voy a exponer. Me veo precisado a repetir esta advertencia, porque pudiéndose colegir de aquí algunas importantes verdades que ilustren la historia antigua, no quiero que se piense que me burlo con pensamientos ingeniosos en una materia en que interesa tanto la erudición. Bien

que, creo que el lector erudito que se tome el trabajo de combinar bajo una idea las noticias históricas que nos han quedado de esta nación, si por otra parte ha tratado con alguna frecuencia (y no superficialmente) a los indios; si ha penetrado su genio y su carácter misterioso y enfático, conocerá la solidez de los fundamentos sobre que establecemos esta interpretación. En fin, el lector juzgara como gustare: yo estoy certificado de esta verdad.

Tenían los moscas su calendario descrito en las manos, teniendo en cada dedo colocados mentalmente sus signos, según el orden de sus números, a manera que los músicos tienen en la mano las cuerdas del sistema de Aretino. Este era el libro, o si se quiere, la tabla pública de su calendario.

Los signos que tienen facciones humanas representan los diferentes aspectos de la luna, que sucesivamente se varían en cada mes.

Mica y Muihica figuran las dos Zisigias; Mica, en los ojos abiertos, el plenilunio y Ia oposición; Muihica en los ojos cerrados, la conjunción o girante.

Bosa y Cuhupcua, las primeras fases de la luna, y Ubchihica las cuadraturas.

El mes y la luna tienen un solo y mismo nombre en su lengua: Chia, y es la palabra que representaba todo lo hermoso, lo brillante, lo honorifico, porque la luz de este astro era entre ellos el símbolo de la belleza y de la virtud.

Esta distribución de fases en la mano esta llena de artificio; pero como no sabemos a punto fijo el uso que hicieran de ella los moscas, nos abstenemos por ahora de explicarla, contentándonos con insinuar lo que significa respecto a lo que nos consta que ellos practicaron.

Cuhupcua es la neomenia. No es esta una neomenia tan puntual y precisa como la de los hebreos, observada desde los lugares mas altos y anunciada con trompetas, es una primera fase vulgar y universalmente conocida y como el novilunio en unos meses es mas breve, en otros mas tardío, se colocó en el día cuarto para que hubiese diferencia, a no ser que queramos que Bosa represente la neomenia de

los unos y Cuhupcua la de los otros.

Contando desde Muihica hallaban al número 7 la primera cuadratura, en Ubchihica después de la neomenia; y contando desde Mica encontraban al número 8 la segunda después de la oposición, en el mismo signo. La media oreja que lo caracteriza es un símbolo muy natural de la cuadratura.

Finalmente Bosa les daba la ultima fase de la luna colocada al tercer dedo antes de Muihica.

Esta distribución vulgar y acomodada de las fases de la luna, les daba dividido un mes en diferentes términos, de que podían servirse para el arreglo de los negocios públicos, y a la verdad Ubchihica estaba destinado tal vez para sus juntas o cosas de religión (significa también sentarse mucho en compañía), puede aludir a sus cacerías, y así le podemos considerar como señalado con una de aquellas letras que los romanos llamaron nundinales.

Si parece artificiosa esta tabla o digamos mejor esta mano astronómica, de que no hemos explicado mas que los primeros aspectos, lo es mucho mas el año, pues tenían dos especies de año; el uno vulgar de veinte lunas y el otro de treinta y siete, al que por ahora llamaremos astronómico, pero de tal suerte mezclados entre si, que no sólo no se turbaban ni confundían, sino se ayudaban sirviendo el uno a dirigir. conservar y facilitar el uso y la perpetuidad del otro.

Ya hemos dicho muchas veces que los moscas miraban como sagrado el número 20. No podían menos que ajustar por él el año, porque de otra suerte se hubieran confundido en todas sus cuentas. Los plazos para los pagos en su comercio, las convenciones solemnes entre sus jefes, el orden de los sucesos y la cronología de su nación, todo se debía gobernar por este número; Gueta era el símbolo de la felicidad, y entre esta gente supersticiosa hubieran sido menguados e infelices los años que no se hubiesen sellado con este carácter; era, pues, inexcusable entre ellos el año de veinte lunas. Pero en este supuesto, ¡Cuántos inconvenientes! Los

equinoccios se hubieran mudado: esto les hubiera sido de poco cuidado a los indios, porque como distamos unos cuatro grados y medio de la linea, tenemos los días y las noches perfectamente iguales. Pero los dos inviernos y los dos veranos que logramos en la zona tórrida y que solo consisten en que llueve o no llueve, se hubieran trocado; corriendo sus signos indiferentemente por un círculo perpetuo pasarían por todas las estaciones; y se hubiera trastornado también el orden de las siembras y jamás hubieran podido hallar un punto fijo para gobernar sus labranzas, negocio importante para toda gente, pero mucho mas para ellos que hacían su primer ídolo de la sementera, por cuya causa inventaron los otros años; pudiéndose decir de los moscas que Ceres fue la madre de todos sus dioses.

No hubo, pues, otro medio que ocultar un año particular en el año vulgar de veinte lunas, pero con artificio tan fino y delicado que su uso se facilitase, aun respecto del rudo pueblo, y que para este fin se correspondiesen entre si con tanta regularidad que en ninguna manera pudiesen confundirse.

Para explicarlo mejor debo suponer que un año lunar de doce lunaciones compone solamente la suma de días y seis horas, y así, es once días mas corto que el solar que consta de 365; es necesario, pues, añadir una lunación entera al tercer año lunar, de suerte que tenga trece lunaciones, y de esta manera vienen a coincidir el lunar y el solar pasada la luna 37ª, pues 37 meses lunares componen la misma suma de días que 36 solares. Este computo es muy antiguo y le han conocido casi todas y las naciones, y así sobre este principio ruedan todos los calendarios.

En este supuesto se entenderá el año oculto de los moscas, porque pasadas las 20 lunas de un año, al siguiente, llegando a la 17ª en que les competía sembrar, según el mes por donde habían comenzado, la intercalaban, es decir, la dejaban pasar como inoficiosa, y sembraban en la siguiente que era la 18ª, y de este modo, aunque corrían perpetuamente sin intermisión el círculo de 20 lunas, cada bienio intercalaban del modo expresado la luna, a la que correspondía el número diez y

siete.

Este método hubiera sido muy expuesto y confuso si no se hubiera establecido bajo un pie fijo y con reglas fáciles y generales. Tenía, pues, destinados para este objeto, cuatro signos: el primero Ata, y los tres últimos del año Suhusa, al cual llamaban por esto, la cola; Aca y Gueta, que eran los que fenecían el año de veinte lunas y a los que por esta razón podemos llamar terminales. Comenzando, pues, por Ata, tocaba el número 17 del siguiente a Cuhupcua, a quien por esta intercalación llamaban con toda propiedad el sordo, y se hacia la siembra en el siguiente Suhusa 18. Pasado el año de veinte lunas, al siguiente tocaba el número 17 a Muihica, el ciego, y pasaba la siembra y representación del primer mes a Aca. En el bienio de éste correspondía el 17 a Hisca, y entraba Gueta en el lugar y en los oficios de Aca; en su bienio era 17, Ta, y volvía el turno al primero, Ata.

Aunque Gueta, 20, es a quien toca el expresado oficio en la tabla que hemos formado de este año. en la restante explicación por la mayor facilidad usamos del carácter Ubchihica, que es lo mismo para este efecto.

Al año de veinte lunas llamaban Zocam, que según sus raíces quiere decir asir o aferrar de arriba, término muy significativo, que expresa la unión del uno con el otro, esto es, del año de veinte lunas que pasó con el de las otras veinte que sigue para seguir su vuelta en un continuado círculo; palabra enérgica que corresponde a la xiuhmolpili con que los mexicanos conocían aquella su célebre rueda de cincuenta y dos en cincuenta y dos años, que en aquella lengua quiere decir atadura de los años.

Para el otro año que estaba como embebido en este, o no tenía voz con qué significarlo o le conocían por el de Cuhupcua, en cuya virtud, para un año tan desconocido me permitirá el lector usar de término nuevo, y le llamaremos Acrótomos; esta palabra griega significa una cosa cuyas extremidades o partes últimas están cortadas, y así me parece que señala con toda propiedad el año de que va-

mos hablando.

Con lo que hemos expuesto se conoce la idea del calendario, pero para que se pueda formar un entero concepto de la correspondencia de todos sus meses, hemos formado la tabla que lo contiene, y que para mayor claridad e individuación explicaremos en el número siguiente con todas sus circunstancias.

V - DEL AÑO ACROTOMOS

(Año astronómico o intercalar)

El año acrótomos se gobierna con tres signos terminales que están como partidos, para este intento, y que sin embargo conservan las representaciones de su número en el año que va continuado de 20 lunas en el modo siguiente: Sea Ata por suposición correspondiente a enero como apto para las siembras; este signo tiene dos oficios en este caso: ser primer mes en el año de veinte lunas que comienza, cuyo carácter no pierde jamás; y ser primero del año acrótomos, cuyo carácter pierde en llegando a su término que es la luna 37. Señala, pues, las sementeras que se deben hacer de doce en doce lunas, y que son otros tantos meses enero del año acrótomos, en el modo siguiente: (a Ata, y a los demás terminales les corresponde la siembra primera de su respectivo año) conviene a saber, 2ª siembra Mica, 3ª Hisca, 4ª Cuhupcua, inoficioso intercalar, y así sigue otro turno; entre tanto, Ata dejando este oficio a Suhusa continua gobernando su año de 20 lunas, que no se ha concluído, Suhusa en este círculo perpetuo y en esta situación es el mes l8; pero en el turno del año acrótomos le toca ser primero por exclusión de Cuhupcua; en éste, pues, señala las sementeras siguientes: 2ª Ubchihica, 3ª Bosa, 4ª número 37, Muihica se elude por inoficioso; concluye su turno Suhusa, y en su lugar y con la representación de enero entra Aca que es número 19 en el año de 20 lunas; pero primero en el año acrótomos señala las sementeras siguientes: 2ª Ata, 3ª Mica, 4ª Hisca intercalar número 37; concluído este turno entra Ubchihica, último mes del año de 20 lunas y primero en este turno del año acrótomos; sus sementeras son

2ª Bosa, 3ª Muihica, 4ª la número 37 se elude y vuelve el turno a Ata. Este es el sistema del año de los indios muiscas.

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En la memoria que Duquesne presento al célebre botánico Mutis y que fue el resumen de sus estudios, dice:

Esta intercalación que se verifica perpetuamente, dejando pasar como inoficiosa o como sorda la luna 37, nos hace concebir que dentro de los dos años vulgares de veinte lunas cada uno, hay otro año astronómico oculto que consta de 37 lunas, de modo que la luna 38 seria un verdadero enero. Los indios sin penetrar la teoría de esta proposición, que ha sido embarazosa en otras naciones mas cultas, por esta luna que ha sido necesario añadir al fin de cada tres años lunares, por ser los dos anteriores de doce lunas y el tercero de trece, tenían suma facilidad en la práctica de su intercalación, siguiendo el método propuesto, conservando así el año astronómico, sin que el pueblo notase diferencia alguna en sus años vulgares de veinte lunas cada uno.

El año vulgar de veinte lunas servia para las treguas en la guerra, como consta de su historia, para las compras y ventas y otros negocios de la sociedad. Pero el año astronómico e intercalar de 37 lunas, que se contaba por tres sementeras, servía principalmente a la agricultura y a la religión, y así llevaban su cuenta con mucha prolijidad los jeques (sacerdotes) y mayores a quienes correspondía, notando sus épocas con sacrificios mas particulares, y grabándolas también en piedra por medio de símbolos o figuras, como se ve en un pentágono que tengo en mi poder y voy a explicar al fin de este papel.

El siglo, pues, de los muiscas constaba de veinte años intercalares de 37 lunas cada uno, que corresponden a sesenta años nuestros y lo componían de cuatro revoluciones contadas de cinco en cinco, cada una de las cuales constaba de diez

años muiscas, y quince nuestros, hasta completar los veinte, en que el signo Ata vuelve a tomar el turno de donde comenzó la vez primera. La primera revolución se cerraba en Hisca, la segunda en Ubchihica, la tercera en Quihicha Hisca y la cuarta en Gueta.

VI – DE LAS SEMANAS, DIAS, ETC.

Al día artificial le llamaban Sua, esto es, un sol midiéndole de levante a poniente. A la noche llamaban Za del ocaso hasta su levante. Al día lo dividían en dos partes, del levante al punto de la meridiana, la mañana, Suamena; y desde ésta al ocaso la tarde Suameca. Del ocaso hasta el término de una hora u hora y media, la prima noche, Zasca; y desde la una de la noche al levante del sol, la madrugada Cagui. Estas eran sus horas, distinguidos los dos puntos de madrugada y prima noche, con dos comidas que eran y son las únicas que hacen.

La semana era de tres días, y se conoce que usaban de ella porque cada tres días hacían en Turmequé, lugar perteneciente al Guatavita, un mercado. De suerte que así como los mexicanos hacían sus mercados de cinco en cinco días para dividir por este número los días de la luna, como lo afirma el padre Torquemada, por una analogía semejante hacían el mas rico los moscas de tres en tres días, por relación a la memoria de que hemos hablado.

(Papel Periódico Ilustrado. Año III. Pagina: 298 a 303)

SACRIFICIO DE LOS MOSCAS Y SIGNIFICADOS O ALUSIONES DE LOS NOMBRES DE SUS VÍCTIMAS

Por el doctor José Domingo Duquesne – 1795

Tenían los moscas el cuidado de señalar las revoluciones del año con las cosas más notables. No había siembra ni cosecha sin sacrificio. Tenían en cada pueblo una calzada ancha y nivelada que salía del cercado o casa del cacique, y corría como por media legua, rematando en un palo labrado en figura de una gavia, de que pendían al miserable cautivo que ofrecían al sol y a la luna para obtener una cosecha abundante.

Venían en mojiganga los indios, repartidos en diferentes cuadrillas, adornados de muchas joyas, lunas y medias lunas de oro; disfrazados unos con pieles de osos, tigres y leones; enmascarados otros con máscaras de oro, y lagrimas bien retratadas, a los cuales seguían otros con mucha gritería y risotadas, bailando y brincando con descompasados movimientos; otros traían unas grandes y largas colas, que iban pisando los que los seguían, y llegando al término de la calzada disparaban todos sus flechas y tiraderas al infeliz cautivo, matándole con larga muerte, y recibiendo su sangre en diferentes vasijas, terminaban la barbara función con sus acostumbradas borracheras.

Nuestros historiadores se admiran mucho del fausto y de la extravagancia de estas procesiones, pero nos dieron una idea muy diminuta, refiriendo de una manera general sus cuadrillas. En lo poco que describieron se conoce que esta mojiganga o procesión era un símbolo de su calendario, y, si las hubieran dibujado todas, nos ayudarían a formar el concepto de sus signos, y de los caracteres que les atribuían.

Pero la víctima destinada a solemnizar las cuatro lunas intercalares que partían el siglo, estaba señalada con muchas circunstancias. Era esta un miserable mancebo, que precisamente había de ser natural de cierto pueblo, sito en los llanos que

llamamos hoy de San Juan. Horadábanle las orejas, le criaban desde mediano en el templo del sol; en llegando a diez años nuestros, le sacaban para pasearle, en memoria de las peregrinaciones del Bochica su fundador, a quien se figuraban colocado en el sol, y continuando en un matrimonio feliz con la luna y una lucidísima descendencia. Vendíanle en precio muy alto, y era depositado en el templo del sol hasta cumplir quince años nuestros, en cuya precisa edad hacian el bárbaro sacrificio, sacándole el corazón y las entrañas para ofrecérselas al sol.

A este mozo le llamaban Guesa, y también Quihica: Guesa, que quiere decir mancebo, de aquí sale el verbo guesansuca, ir creciendo en edad, pero esta palabra tiene mucho énfasis porque denota precisamente una edad que no puede llegar a 20 años; y así para la juventud más crecida o mayor, tienen otro término que es Guas-gua-cha. Esto es así, y se reconoce más buscando las raíces de que esta formada, que son gue y za, partícula negativa que quiere decir literalmente sin veinte; por la historia se conoce la imposición de este nombre.

Mas, así como gue es la raiz de veinte (Gueta) también lo es de esta palabra casa, y quiere decir sin casa,lo que encierra la otra circunstancia que según la historia debía tener este miserable mozo, pues que lo criaban en un templo del sol, y en comprándolo debían colocarlo en otro templo, y por esta razón no tenia casa. Querían los indios que no tuviese el menor comercio, y menos impuro, porque en este caso le desechaban, y a esto miran directamente estas significaciones.

Mas también puede significar casa oscura, porque gue es la casa, y zu la noche, y es modo que se conforma con sus frases. Lo que hace relación a la conjunción de la luna.

Quihica es la boca, y por alusión la puerta, pero en su lenguaje no tiene otro término que éste para significar la puerta de la casa, o de cualquier otra cosa. Por tanto, la primera y obvia significación de estas dicciones, gueza quihica, es el mancebo, que es boca, o el mancebo que es puerta; según, pues, las explicaciones

de arriba, puede decir, la puerta de la casa oscura, o de la noche oscura, o de la juventud.

Se debe suponer que en esta lengua, como en todas las orientales, cada palabra es una definición, y las compuertas encierran muchos sentidos, y son muy enfáticas en todas sus alusiones. Cuhucuaque tiene la misma raíz que Cuhupcua, o por decirlo mejor, es la misma voz tomada adverbialmente, y significa señal. Muihica, se compone de mui y de hica: mui es el palacio, la casa grande: hica, la palabra, y es lo mismo que decir en nuestra lengua la palabra de la casa grande o del palacio. Mas, esta raíz, mui, es raíz del verbo muisca, que significa tender o extender, el participio del presente que también es muisca, significa el hombre y esta palabra que denota toda la nación, por lo cual los españoles (aun sin entender todavía la lengua de este pueblo) atendiendo a su prodigiosa multitud, corrompieron el vocablo y les llamaron moscas. Los indios tuvieron en cuenta el mismo fin cuando aplicaron a toda su nación este verbo, esto es, gente extendida. Es muy enérgica esta voz, porque alude al barro de que Dios formo el primer hombre, y de aquí nació también la palabra muisquien, que significa la naturaleza, y muihica, cosa negra, por el color del barro y el de la gente de la misma nación. Del mismo verbo nace la palabra muiso, mudada la partícula sca en so, como acostumbran estos indios, significa cosa tendida o arrastrada, y aplicaron esta voz a significar la culebra, y los indios de hoy (1790), llaman en español a este animal rastra, conservando el significado de su lengua.

Por esto se vendrá en conocimiento de los misterios que encierran la lunación designada con esta voz muihica, que hace relación a las casas de los indios, a sus personas, a su nación, a su lengua, a las culebras y a la oscuridad de la conjunción, porque en si encierra con un énfasis particular todos estos significados, y unida a la voz guesa, la puerta de la casa o de la noche oscura, o la boca de la inocencia, de la juventud, etc.

Esta víctima (el guesa) según la historia, estaba dedicada al sol; véase aquí, pues,

una representación del Jano de las otras naciones, No era otro este dios multifirme que el sol que gobierna el tiempo, que con una cara mira a lo pasado y con otra a lo futuro. Se han encontrado también medallas que tenían cuatro caras, aludiendo a las cuatro estaciones. La etimología de puerta (quihica) es bien conocida, pero se debe saber que la imposición de este nombre no era sólo porque mirase los tiempos, sino porque le consideraban como una puerta por donde entraban todos sus ruegos a los dioses. Así Ovidio, gran comentador de la teología pagana, dice:

... Cur quamvis aliorum numina placem,
¿Jane tibiprimum thura merumqle fero?
Ut possis aditum per me qui limina servo
ad quos cumque voles. inquit, habere deos.

No es tiempo de examinar el origen de la fábula en los indios, asunto que tocaremos en disertación separada, y que es igualmente original porque hasta ahora no la ha tratado ningún erudito. Pero no es menester mucha penetración para conocer que las mismas causas que han movido a los romanos para estas invenciones, intervinieron entre los indios, Testo señala esta para aquellas gentes: quod fuerit omnium primus (dice) a quor erum omnium putabant initium ideo ei suplicabant velut paretis:. Los indios, según la historia, habían colocado en el sol a su padre y fundador Bochica, y así les fue fácil tratarlo con los mismos respetos; pero el verdadero motivo de los indios estaba en la persuación en que estaban de la sordera de la luna; estaba su casa cerrada y era necesario abrir la puerta y esta miserable victima (el guesa) era en su concepto la puerta por donde entraban sin estorbo sus ruegos.

A mas de esto era la boca de la nación que hablaba de cerca a la luna sorda y así no podía desentenderse de sus gemidos cuando llegasen hasta el cielo, porque gritando ellos desde acá abajo no los oía. Este era el modo de discurrir de esta gente ilusa, y es bien claro porque no hacían sacrificios de otros animales que de loros,

papagayos y pericos, y éstos no llegaban a las aras hasta que hubiesen aprendido su lengua, porque sus victimas habían de tener voz para gritar de cerca a la luna. Volaban, en su opinión, los pericos y los loros después de muertos, aún más arriba que cuando vivos. Pero si no basto el águila a Júpiter, fue necesario que esta ave arrebatase a Ganimedes: este es el infeliz y desdichado guesa, esto es, la señal de sus años y la víctima que se hacía a Cuhupcua cada quince años nuestros, es decir, cada cinco acrótomos; hasta que señalado cada uno de los caracteres con una victima particular concluyese en el círculo del tiempo, una vuelta entera hasta veinte que hacen 60 años nuestros, que era su edad privilegiada.

Es verdad que el señor Piedrahita habla tan generalmente y pone tan vagas todas las circunstancias de este sacrificio, que no lo pudo determinar. Parece una solemnidad incierta y voluntaria, pero no es así. No digo yo un sacrificio de tan prolijas circunstancias, que efectivamente se conoce ser el compendio y la cifra misteriosa de todas sus supersticiones: pero aun las cosas de menos consideración, todo, grande o pequeño, es nivelado por sus reglas entre los indios. Todos saben que éstos han sido la gente de las ceremonias, y que no hay ninguna que no tenga su peso y su medida determinados.

En esta consideración, habiendo omitido nuestros autores todas aquellas circunstancias que desestimaron por parecerles ridículas y extravagantes o porque no eran necesarias para llenar los intentos y objetos de sus historias, nos vemos en la necesidad de ilustrar esta parte, haciéndonos prolijos, contra nuestro genio, para satisfacer cumplidamente al lector, y para que no juzgue que trabajamos sobre nuestras voluntarias imaginaciones.

El Bochica (de cuyos caracteres trataremos separadamente) fue el fundador, legislador y padre de los moscas. Sea que viniese por la Groenlandia a pasar por el Istmo de Panamá, por larguísimos rodeos y giros interminables, o sea porque navegase desde el cabo de San Vicente, como parece natural, es verdad averigua-

da que llegó por los llanos que hoy llamamos de San Juan a tomar posesión de Sogamoso, y desde allí, de todos los hermosos países que habito la extendida y númerosa nación de los moscas. Vivió largo tiempo (aunque no el que quisiesen los indios), como se puede creer de los primeros pobladores, habiendo sido los maestros de sus hijos a quienes comunicaron los primeros elementos de las artes, en las que después se ejercitaron, las leyes fundamentales de sus gobiernos y el uso de los tiempos para el arreglo de las labranzas. A lo menos los fundamentos para pensar que el Bochica tuvo tiempo para sembrar en sus nietos estos conocimientos. Hallándose viejo, sea que quisiese despedirse de sus hijos y que quisiese repartirles por si mismo las tierras en que se establecieron; o sea que los que se encaminaron a Bacatá, necesitasen de sus consejos y dirección para facilitar el paso al rió Funza, que anegaba los mejores y mas extendidos campos; ya porque se detenían en algunos estorbos formados por el inmediato diluvio; ya porque los mismos campos bajos facilitasen la salida de las aguas, es de suponerse que él intervino en la dirección de estas obras, y que visito muchos de aquellos lugares. Restituido a Sogamoso, murió dejando por heredero de la suprema autoridad, que le competía como a cabeza y padre de toda la nación, a su primogénito.

Es muy regular que un anciano de tanto mérito, fuese el oráculo de los moscas cuando vivo, y que lo fuese de sus lagrimas y de sus deseos después de muerto. Pero los indios no conocieron los limites del respeto y de los obsequios debidos al padre y pasaron a los cultos propios de la divinidad. Estos hombres quisieron perpetuar la memoria de la venida del Bochica haciendo una calzada o carrera desde la boca de los Llanos a Sogamoso, que tendrá como cien leguas de longitud, muy ancha y con sus valladares o pretiles por una y otra parte, aunque ya maltratada y oscurecida con la paja y barrizal que se han criado en ella, por la cual dicen que subió Bochica desde los Llanos al Nuevo Reino.

De aquí tomaron idea para hacer otras calzadas semejantes, como la de Bacatá,

y en los lugares mas señalados con los vestigios del Bochica, hasta que paso a ser adorno general de todos sus pueblos, y entrada de los templos y casas de sus caciques, en donde se ejecutaban las danzas, procesiones y sacrificios.

Por alusión a estas tradiciones o por la mayor opulencia de los caciques se hicieron con el tiempo más célebres algunos lugares, y como adoraban al Bochica, colocado en el sol, pretendieron ennoblecerlos con templos más suntuosos que eran como los santuarios de su mayor veneración.

El templo de Sogamoso, dedicado al sol, era el centro de su religión y el mas privilegiado. Seguían a éste los de Bacatá, Guachetá y Guatavita; pero el principal era aquel que tenían en el pueblo en donde comenzaba la antigua y espaciosa calzada que servia de memoria perpetua de su establecimiento en este lugar y de las hazanas gloriosas de su héroe.

Esta es en pocas palabras la historia primitiva de los moscas, desenredada de las fabulas de los indios que de estos pasajes históricos hicieron innumerables misterios. Entre ellos se debe reparar el misterioso sueño del Bochica que estuvo durmiendo en Sogamoso veinte veces cinco veintes de años, cuya portentosa época quisieron conservar a esfuerzos de las mayores crueldades.

He aquí puesta en claro la historia del guesa con todas sus circunstancias. El 20 y el 5 veces 20 es misterioso en toda la secuela del sacrificio; por eso dividieron los años terminales de cinco en cinco, acabando de contar en el que habían comenzado y de esta manera cada cuatro acrótomos salía la víctima del templo a recordar a los indios que se acercaba esta estupenda solemnidad, pues que así acostumbraban estarse avisando sucesivamente de varios modos de lo que tienen mas presente y nunca se les olvida. Era sacrificada la victima al fin del quinto acrótomos, y ese mismo día era entregado a los sátrapas del templo de los llanos el sucesor de esta desgraciada, y de esta manera señalado cada quinquenio con una victima en cuatro actos detestables y crueles, se concluía la lastimosa tragedia, y se contaba uno

de los señalados 20 que no tenia cuando acabarse, y empezaba otra escena.

Los indios tuvieron la crueldad de imponer a sus víctimas los nombres y la representación de sus dioses: las historias de México están llenas de estas narraciones; por lo que mira a los moscas, ya que no tuvieron al guesa por el Bochica, le tenían por hijo suyo, por tanto el paseo que le hacían dar por las poblaciones no carecía de misterio, era este una especie de peregrinación que llevaba sus representantes de los viajes del Bochica. Verosímilmente le tocaba a cada templo de los memorables y dedicados al sol por esta circunstancia, la compra de la víctima en cada turno. Los templos eran cuatro, y servía esta distribución de nueva serial para el gobierno de los años, porque empezaba nueva edad cada vez que se concluían las cuatro estaciones; el que conozca los libros de cuentas que usan los indios hallara verosimilitud en este computo. Es de advertir que a las calzadas o camellones les daban el nombre que a los años; suna ata, suna bosa, etc., un camellón, dos camellones. etc., porque como éstos eran los teatros de sus procesiones y sacrificios eran también el libro en que se iban registrando.

Aun cuando caminaban con el muchacho (el guesa) buscando en todas partes quien lo comprara, esto era una formula, pues no lo podían vender sino en el lugar de su destino. Y así, aunque por veneración compareciesen haciendo ostentación de hacerse dueños de una victima, entre ellos tan preciosa, se cuidaban mucho los mercaderes de ponerle unos precios excesivamente crecidos, como que no podían venderla, y esta cruel ficción había pasado a costumbre y a misterio. Así nacen las cosas entre el pueblo, y así crecen entre supersticiones. Lo cierto es que aunque fuese cara para que no se hiciese común, ya tenia su precio señalado y fijo, del que no podía pasarse, y yo aseguro que en cada pueblo estaba tan bien repartido este precio entre las personas a quienes tocaba comprarlo, porque esto es lo conforme con su genio y con su política.

Esta víctima, que era un sacrificio publico de la nación, bastaba para fijar los

años, no solo entre los magistrados y sacerdotes de los templos que debían llevar una cuenta exacta del calendario sino en todos los pueblos: pero como este sacrificio se hacia en una sola parte, a la que no podían concurrir todos, es de presumirse que tendrían en los demás otra ceremonia igualmente cruel para solemnizar esta memorable revolución de sus años. El padre Zamora asegura que ademas del sacrificio del guesa, el demonio les había persuadido que no había otro mas grato a los dioses que el de algunos mancebos que no llegasen a veinte años; así, aunque en las demás partes no fuesen tan costosas, ni tan circunstanciadas éstas víctimas, estaban señaladas con la edad, que era el misterio principal en semejantes ofrendas.

(Papel Periódico Ilustrado. Año III. Pagina: 313 a 315)

EXPLICACIÓN DE LOS SÍMBOLOS DEL SIGLO

Por el doctor José Domingo Duquesne

Tengo en mi poder un manuscrito, que según parece contiene una de estas revoluciones del tiempo. Los amantes de la bella literatura gustaran de leer en estos caracteres tan extraños, y mucho mas cuando se puede mirar como un pedazo del alfabeto chibcha, con cuyas notas se podrán imponer y aun adelantar en otros semejantes; de suerte que estos fragmentos que suelen encontrarse, no serán en adelante un mueble vano, sino un adorno importante de un gabinete de historia.

Es una piedra chica, especie de jaspe negro, tersa, y su figura un pentágono. El primer lado es más largo que los otros, tiene de relieve la figura de un sapo o rana, con más cola y sin patas, e, sobre un plano limitado por cuatro líneas; mas adelante se encuentra una linea gruesa, f, en forma de una culebrilla que en el dorso tiene dos lineas paralelas de iguales dimensiones. El segundo tiene grabado un sapo, a, en actitud de brincar sobre un plano limitado por cuatro lineas como el anterior. El tercer lado contiene una linea gruesa en forma de un dedo, b, señalado con tres líneas gruesas transversales y en medio del dorso se levanta una prominencia casi como una nariz, señalada por los lados con dos puntos opuestos, uno en cada lado. El cuarto contiene otra linea gruesa, c, como la anterior; esta figura se distingue en que no ocupa el centro, esta hacia un lado del plano. El quinto, d, es como los dos anteriores, conservando el centro como la primera.

Uno de los planos tiene un círculo, g, cortado por un segmento, en el cual hay una especie de dibujo con doble línea en angulo obtuso, h. En el otro plano se ve un círculo menor, k, que tiene en el centro un punto, y esta cortado, con un segmento, de cuyos extremos parten dos líneas que se unen hacia fuera formando un angulo; en el mismo plano se encuentra la figura m, que es una culebrilla; en su dorso se ven dos lineas paralelas; hacia la cabeza tiene un angulo agudo puesto de lado y a la cola un triangulo partido por una linea mas gruesa tirada descuidadamente.

Interpretación. – Esta simbolizada en esta piedra la primera revolución del siglo muisca, que comienza en Ata, y acaba en Hisca, el cual incluye nueve años y cinco lunas muiscas. Los indios, que para todo usan el círculo, aquí prefieren el pentágono, para significar que hablan de cinco años intercalares.

a. El sapo en acción de brincar es el signo del principio del año y del siglo.

b. Esta especie de dedo señala en las tres lineas gruesas, tres años.

Omitiendo, pues, el dedo c, que esta a un lado, cuento en el dedo d, otros tres años, que, juntos con los del dedo b, producen seis. Lo cual denota la intercalación de Quihicha ata, que sucede puntualmente a los seis años muiscas, como se ve en la tabla; y es de mucha consideración entre los indios por pertenecer al sapo que arregla todo el calendario.

e. Es el cuerpo de un sapo de cola y sin patas, es símbolo de Quihicha ata; y por carecer de patas es figura muy propia para expresar su intercalación, porque el mes intercalar no se computa para la sementera, y así lo imaginaban sin acción y sin movimiento. Se ve sobre un plano, como también el sapo Ata, para significar que en una y otra parte se habla del sapo.

f. Esta culebrilla representa el signo Suhuza, que es el que se intercala después de Quihicha ata, a los dos años muiscas representados en las dos líneas gruesas que tiene el dorso. Lo que corresponde al año octavo. como se ve en la tabla.

Como concluimos con los lados del pentágono pasemos al plano.

La culebra m es una reproducción de Suhuza, y como esta tendida sobre una especie de triangulo, símbolo de Hisca, significa que se intercala inmediatamente después de Suhuza al segundo año, lo que esta figurado igualmente en las dos lineas gruesas que tiene el dorso.

Como el fin principal de esta piedra cronológica es señalar la intercalación del signo de Hisca, por ser el término de la primera revolución del signo muisca, para mayor claridad están contados estos años en los tres dedos, conviene a saber: b, c,

d, que juntos producen nueve años, que son los que dan puntualmente esta notable intercalación, que sucede a los nueve años y cinco meses como se ve en la tabla.

g. Es un templo cerrado; h, es la cerradura que hasta el dia de hoy usan los indios en sus puertas, y llaman candado cormo. Los agujeros de las dos orejas sirven a la estacas que le ponen, y los dos ganchos interiores para asegurar la puerta. Significa la primera revolución del siglo, cerrada en Hisca, y para que continuase el tiempo, era necesario en su imaginación (es decir, en opinión de los indios) que el guesa abriese la puerta con el sacrificio de que hemos hablado y cuyas circunstancias eran simbólicas, relativas a esta revolución del siglo.

El círculo menor, k, con los radios que están en el otro plano, figuran a Cuhupcua, esto es, la luna intercalar 3 y sorda, y la unión y conjunción particular del sol con la luna que veneran tan misteriosamente y a la que se dirigía esta revolución.

La culebra m, es símbolo del tiempo. El angulo es número cinco como el de los romanos: le usaban los indios para explicar cinco, porque contaban por los dedos levantando el dedo indice y el dedo medio en alto, como todavía practican; esta figura y las líneas del dorso de la culebra, que es una representación de Suhuza, significan que se deben tomar los terminales cinco veces. como ya hemos explicado.

La culebra. por otra parte, ha sido el símbolo del tiempo en todas las naciones. Esta primera revolución del siglo estaba consagrada principalmente a las nupcias del sol y la luna, simbolizadas en el triangulo, no sólo según los indios, sino según otras naciones.

EXPLICACIÓN DE LA TABLA DE LOS AÑOS MOSCAS

Por el doctor José Domingo Duquesne

El círculo interior representa las 20 lunas del año muisca vulgar, cuyos signos todos se intercalan en el espacio del siglo.

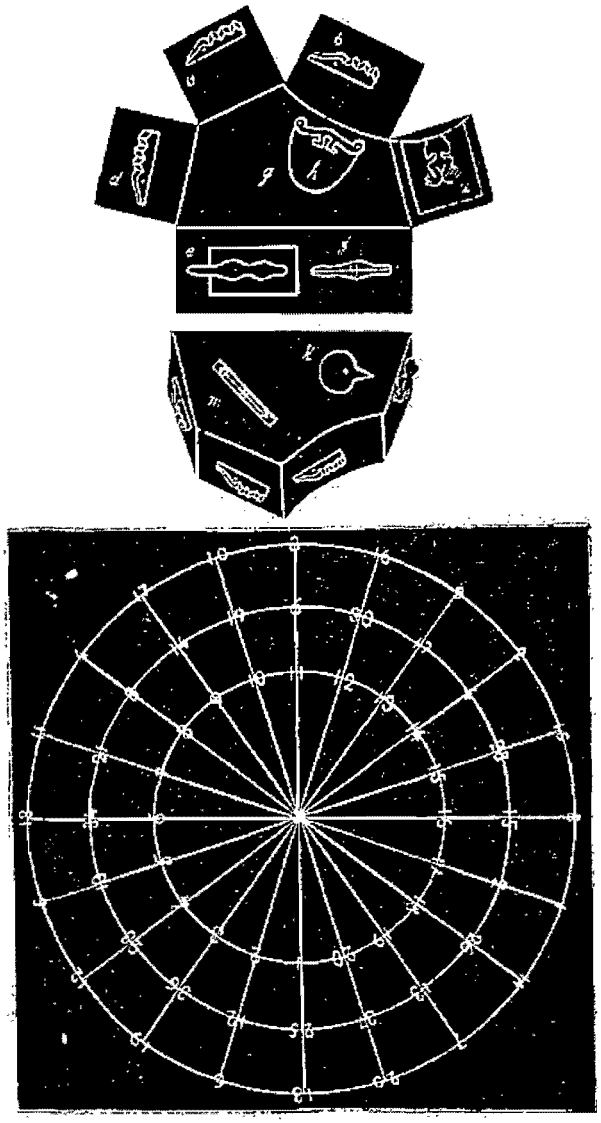
El círculo segundo expresa los años muiscas a que corresponde la intercalación de cada signo.

El círculo tercero expresa el orden de esta intercalación.

Ejemplo: Deseo saber en qué año muisca se intercala el signo mica. Veo en la tabla en el número tres en el círculo interior, hallo en el segundo que le corresponde el número 36, y este es el año que se busca; veo en el siguiente círculo que le corresponde el número 19, y así la intercalación de mica es en orden la décima nona del siglo.

La intercalación de gueta (20) es la ultima del año muisca treinta y siete, esto es, después de un siglo vulgar muisca de años de 20 lunas y mas diez y siete años, de suerte que, terminado el siglo, o revolución astronómica de 20 años intercalares de 37 lunas, cada uno, les faltan tres vulgares, para completar dos siglos vulgares. En llegando, pues, a este caso, no hacían mas cuenta de aquellos tres años vulgares de que no necesitaban para la labranza, ni para la religión, ni para la historia, y empezaban en ata (a que había llegado el turno) un año vulgar, nuevo, principio de un siglo nuevo en todo semejante al primero que hemos descrito.

(Papel Periódico Ilustrado. Año III. Páginas 315 a 318)



Figuras 48 y 49 de la Relación

Appendix B

Muisca centuries table

B.1 Acrotom and Extended Zocam Centuries

This is a table with the sequence of lunar months in the span of an Acrotom 740 century and 2 Zocam centuries or 800 moons. The symbols of the fourth column have the following meaning:

- (S_n): Number n of Revolution of Acrotom century (185 moons)
- (♍): Harvest time (12 or 13 moons)
- (ZC_n): Number n of Zocam century (400 moons)
- (AC_n): Number n of Acrotom century (740 moons)
- (B_n): Number n of Bxogonoa (3700 moons)
- (z_n): Number n of Zocam year
- (a_n): Number n of Acrotom year

	Intercalary year of ATA					*Ata cycle: 1*
☾	Z	A	R	✱	Days	Years
1	Ata $_1$	1	1	♄	29.5306	0.0809
2	Bosa $_2$	2	2		59.0612	0.1617
3	Mica $_3$	3	3		88.5918	0.2426
4	Muihica $_4$	4	4		118.1224	0.3234
5	Hisca $_5$	5	5		147.6529	0.4043
6	Ta $_6$	6	6		177.1835	0.4851
7	Cuhupcua $_7$	7	7		206.7141	0.5660
8	Suhusa $_8$	8	8		236.2447	0.6468
9	Aca $_9$	9	9		265.7753	0.7277
10	Ubchihica$_{10}$	10	10		295.3059	0.8085
11	Q.Ata $_{11}$	11	11		324.8365	0.8894
12	Q.Bosa $_{12}$	12	12		354.3671	0.9702
13	Q.Mica $_{13}$	13	1	♄	383.8977	1.0511
14	Q.Muihica $_{14}$	14	2		413.4282	1.1319
15	Q.Hisca $_{15}$	15	3		442.9588	1.2128
16	Q.Ta $_{16}$	16	4		472.4894	1.2936
17	Q.Cuhupcua $_{17}$	17	5		502.0200	1.3745
18	Q.Suhusa $_{18}$	18	6		531.5506	1.4553
19	Q.Aca $_{19}$	19	7		561.0812	1.5362
20	Gueta $_{20}$	20	8	z_1	590.6118	1.6170
21	Ata $_1$	21	9		620.1424	1.6979
22	Bosa $_2$	22	10		649.6730	1.7787
23	Mica $_3$	23	11		679.2035	1.8596
24	Muihica $_4$	24	12		708.7341	1.9404
25	Hisca $_5$	25	1	♄	738.2647	2.0213
26	Ta $_6$	26	2		767.7953	2.1022
27	Cuhupcua $_7$	27	3		797.3259	2.1830
28	Suhusa $_8$	28	4		826.8565	2.2639
29	Aca $_9$	29	5		856.3871	2.3447
30	Ubchihica$_{10}$	30	6		885.9177	2.4256
31	Q.Ata $_{11}$	31	7		915.4483	2.5064
32	Q.Bosa $_{12}$	32	8		944.9788	2.5873
33	Q.Mica $_{13}$	33	9		974.5094	2.6681
34	Q.Muihica $_{14}$	34	10		1004.0400	2.7490
35	Q.Hisca $_{15}$	35	11		1033.5706	2.8298
36	Q.Ta $_{16}$	36	12		1063.1012	2.9107
37	Q.Cuhupcua $_{17}$	37	13	a_1	1092.6318	2.9915

Intercalary year of SUHUSA					*Ata cycle: 1*	
☾	Z	A	R	✳	Days	Years
38	Q.Suhusa $_{18}$	1	1	♄	1122.1624	3.0724
39	Q.Aca $_{19}$	2	2		1151.6930	3.1532
40	Gueta $_{20}$	3	3	z_2	1181.2236	3.2341
41	Ata $_{1}$	4	4		1210.7541	3.3149
42	Bosa $_{2}$	5	5		1240.2847	3.3958
43	Mica $_{3}$	6	6		1269.8153	3.4766
44	Muihica $_{4}$	7	7		1299.3459	3.5575
45	Hisca $_{5}$	8	8		1328.8765	3.6383
46	Ta $_{6}$	9	9		1358.4071	3.7192
47	Cuhupcua $_{7}$	10	10		1387.9377	3.8000
48	Suhusa $_{8}$	11	11		1417.4683	3.8809
49	Aca $_{9}$	12	12		1446.9989	3.9617
50	Ubchihica$_{10}$	13	1	♄	1476.5294	4.0426
51	Q.Ata $_{11}$	14	2		1506.0600	4.1235
52	Q.Bosa $_{12}$	15	3		1535.5906	4.2043
53	Q.Mica $_{13}$	16	4		1565.1212	4.2852
54	Q.Muihica $_{14}$	17	5		1594.6518	4.3660
55	Q.Hisca $_{15}$	18	6		1624.1824	4.4469
56	Q.Ta $_{16}$	19	7		1653.7130	4.5277
57	Q.Cuhupcua $_{17}$	20	8		1683.2436	4.6086
58	Q.Suhusa $_{18}$	21	9		1712.7742	4.6894
59	Q.Aca $_{19}$	22	10		1742.3048	4.7703
60	Gueta $_{20}$	23	11	z_3	1771.8353	4.8511
61	Ata $_{1}$	24	12		1801.3659	4.9320
62	Bosa $_{2}$	25	1	♄	1830.8965	5.0128
63	Mica $_{3}$	26	2		1860.4271	5.0937
64	Muihica $_{4}$	27	3		1889.9577	5.1745
65	Hisca $_{5}$	28	4		1919.4883	5.2554
66	Ta $_{6}$	29	5		1949.0189	5.3362
67	Cuhupcua $_{7}$	30	6		1978.5495	5.4171
68	Suhusa $_{8}$	31	7		2008.0801	5.4979
69	Aca $_{9}$	32	8		2037.6106	5.5788
70	Ubchihica$_{10}$	33	9		2067.1412	5.6596
71	Q.Ata $_{11}$	34	10		2096.6718	5.7405
72	Q.Bosa $_{12}$	35	11		2126.2024	5.8213
73	Q.Mica $_{13}$	36	12		2155.7330	5.9022
74	Q.Muihica $_{14}$	37	13	a_2	2185.2636	5.9830
1st Supplementary series						
75	Q.Hisca $_{15}$	1	1	♄	2214.7942	6.0639
76	Q.Ta $_{16}$	2	2		2244.3248	6.1448
77	Q.Cuhupcua $_{17}$	3	3		2273.8554	6.2256
78	Q.Suhusa $_{18}$	4	4		2303.3859	6.3065

Intercalary year of ACA					*Ata cycle: 1*	
☾	Z	A	R	✱	Days	Years
79	Q.Aca $_{19}$	1	5		2332.9165	6.3873
80	Gueta $_{20}$	2	6	z_4	2362.4471	6.4682
81	Ata $_{1}$	3	7		2391.9777	6.5490
82	Bosa $_{2}$	4	8		2421.5083	6.6299
83	Mica $_{3}$	5	9		2451.0389	6.7107
84	Muihica $_{4}$	6	10		2480.5695	6.7916
85	Hisca $_{5}$	7	11		2510.1001	6.8724
86	Ta $_{6}$	8	12		2539.6307	6.9533
87	Cuhupcua $_{7}$	9	1	♓	2569.1612	7.0341
88	Suhusa $_{8}$	10	2		2598.6918	7.1150
89	Aca $_{9}$	11	3		2628.2224	7.1958
90	Ubchihica$_{10}$	12	4		2657.7530	7.2767
91	Q.Ata $_{11}$	13	5		2687.2836	7.3575
92	Q.Bosa $_{12}$	14	6		2716.8142	7.4384
93	Q.Mica $_{13}$	15	7		2746.3448	7.5192
94	Q.Muihica $_{14}$	16	8		2775.8754	7.6001
95	Q.Hisca $_{15}$	17	9		2805.4060	7.6809
96	Q.Ta $_{16}$	18	10		2834.9365	7.7618
97	Q.Cuhupcua $_{17}$	19	11		2864.4671	7.8426
98	Q.Suhusa $_{18}$	20	12		2893.9977	7.9235
99	Q.Aca $_{19}$	21	1	♓	2923.5283	8.0043
100	Gueta $_{20}$	22	2	z_5	2953.0589	8.0852
101	Ata $_{1}$	23	3		2982.5895	8.1661
102	Bosa $_{2}$	24	4		3012.1201	8.2469
103	Mica $_{3}$	25	5		3041.6507	8.3278
104	Muihica $_{4}$	26	6		3071.1813	8.4086
105	Hisca $_{5}$	27	7		3100.7118	8.4895
106	Ta $_{6}$	28	8		3130.2424	8.5703
107	Cuhupcua $_{7}$	29	9		3159.7730	8.6512
108	Suhusa $_{8}$	30	10		3189.3036	8.7320
109	Aca $_{9}$	31	11		3218.8342	8.8129
110	Ubchihica$_{10}$	32	12		3248.3648	8.8937
111	Q.Ata $_{11}$	33	13	a_3	3277.8954	8.9746
112	Q.Bosa $_{12}$	34	1	♓	3307.4260	9.0554
113	Q.Mica $_{13}$	35	2		3336.9566	9.1363
114	Q.Muihica $_{14}$	36	3		3366.4871	9.2171
115	Q.Hisca $_{15}$	37	4		3396.0177	9.2980
2nd Supplementary series						
116	Q.Ta $_{16}$	1	5		3425.5483	9.3788
117	Q.Cuhupcua $_{17}$	2	6		3455.0789	9.4597
118	Q.Suhusa $_{18}$	3	7		3484.6095	9.5405
119	Q.Aca $_{19}$	4	8		3514.1401	9.6214

Intercalary year of UBCHIHICA					*Ata cycle: 1*	
☾	Z	A	R	✳	Days	Years
120	Gueta $_{20}$	1	9	z_6	3543.6707	9.7022
121	Ata $_{1}$	2	10		3573.2013	9.7831
122	Bosa $_{2}$	3	11		3602.7319	9.8639
123	Mica $_{3}$	4	12		3632.2624	9.9448
124	Muihica $_{4}$	5	1	♄	3661.7930	10.0256
125	Hisca $_{5}$	6	2		3691.3236	10.1065
126	Ta $_{6}$	7	3		3720.8542	10.1874
127	Cuhupcua $_{7}$	8	4		3750.3848	10.2682
128	Suhusa $_{8}$	9	5		3779.9154	10.3491
129	Aca $_{9}$	10	6		3809.4460	10.4299
130	Ubchihica$_{10}$	11	7		3838.9766	10.5108
131	Q.Ata $_{11}$	12	8		3868.5072	10.5916
132	Q.Bosa $_{12}$	13	9		3898.0377	10.6725
133	Q.Mica $_{13}$	14	10		3927.5683	10.7533
134	Q.Muihica $_{14}$	15	11		3957.0989	10.8342
135	Q.Hisca $_{15}$	16	12		3986.6295	10.9150
136	Q.Ta $_{16}$	17	1	♄	4016.1601	10.9959
137	Q.Cuhupcua $_{17}$	18	2		4045.6907	11.0767
138	Q.Suhusa $_{18}$	19	3		4075.2213	11.1576
139	Q.Aca $_{19}$	20	4		4104.7519	11.2384
140	Gueta $_{20}$	21	5	z_7	4134.2825	11.3193
141	Ata $_{1}$	22	6		4163.8130	11.4001
142	Bosa $_{2}$	23	7		4193.3436	11.4810
143	Mica $_{3}$	24	8		4222.8742	11.5618
144	Muihica $_{4}$	25	9		4252.4048	11.6427
145	Hisca $_{5}$	26	10		4281.9354	11.7235
146	Ta $_{6}$	27	11		4311.4660	11.8044
147	Cuhupcua $_{7}$	28	12		4340.9966	11.8852
148	Suhusa $_{8}$	29	13	a_4	4370.5272	11.9661
149	Aca $_{9}$	30	1	♄	4400.0578	12.0469
150	Ubchihica$_{10}$	31	2		4429.5883	12.1278
151	Q.Ata $_{11}$	32	3		4459.1189	12.2087
152	Q.Bosa $_{12}$	33	4		4488.6495	12.2895
153	Q.Mica $_{13}$	34	5		4518.1801	12.3704
154	Q.Muihica $_{14}$	35	6		4547.7107	12.4512
155	Q.Hisca $_{15}$	36	7		4577.2413	12.5321
156	Q.Ta $_{16}$	37	8		4606.7719	12.6129
3^{d} Supplementary series						
157	Q.Cuhupcua $_{17}$	1	9		4636.3025	12.6938
158	Q.Suhusa $_{18}$	2	10		4665.8331	12.7746
159	Q.Aca $_{19}$	3	11		4695.3637	12.8555
160	Gueta $_{20}$	4	12	z_8	4724.8942	12.9363

Intercalary year of ATA						*Ata cycle: 2*
☾	Z	A	R	✱	Days	Years
161	Ata $_1$	1	1	♄	4754.4248	13.0172
162	Bosa $_2$	2	2		4783.9554	13.0980
163	Mica $_3$	3	3		4813.4860	13.1789
164	Muihica $_4$	4	4		4843.0166	13.2597
165	Hisca $_5$	5	5		4872.5472	13.3406
166	Ta $_6$	6	6		4902.0778	13.4214
167	Cuhupcua $_7$	7	7		4931.6084	13.5023
168	Suhusa $_8$	8	8		4961.1390	13.5831
169	Aca $_9$	9	9		4990.6695	13.6640
170	Ubchihica$_{10}$	10	10		5020.2001	13.7448
171	Q.Ata $_{11}$	11	11		5049.7307	13.8257
172	Q.Bosa $_{12}$	12	12		5079.2613	13.9065
173	Q.Mica $_{13}$	13	1	♄	5108.7919	13.9874
174	Q.Muihica $_{14}$	14	2		5138.3225	14.0682
175	Q.Hisca $_{15}$	15	3		5167.8531	14.1491
176	Q.Ta $_{16}$	16	4		5197.3837	14.2300
177	Q.Cuhupcua $_{17}$	17	5		5226.9143	14.3108
178	Q.Suhusa $_{18}$	18	6		5256.4448	14.3917
179	Q.Aca $_{19}$	19	7		5285.9754	14.4725
180	Gueta $_{20}$	20	8	♃	5315.5060	14.5534
181	Ata $_1$	21	9		5345.0366	14.6342
182	Bosa $_2$	22	10		5374.5672	14.7151
183	Mica $_3$	23	11		5404.0978	14.7959
184	Muihica $_4$	24	12		5433.6284	14.8768
185	Hisca $_5$	25	13	a_5,S_1	5463.1590	14.9576
186	Ta $_6$	26	1	♄	5492.6896	15.0385
187	Cuhupcua $_7$	27	2		5522.2201	15.1193
188	Suhusa $_8$	28	3		5551.7507	15.2002
189	Aca $_9$	29	4		5581.2813	15.2810
190	Ubchihica$_{10}$	30	5		5610.8119	15.3619
191	Q.Ata $_{11}$	31	6		5640.3425	15.4427
192	Q.Bosa $_{12}$	32	7		5669.8731	15.5236
193	Q.Mica $_{13}$	33	8		5699.4037	15.6044
194	Q.Muihica $_{14}$	34	9		5728.9343	15.6853
195	Q.Hisca $_{15}$	35	10		5758.4649	15.7661
196	Q.Ta $_{16}$	36	11		5787.9954	15.8470
197	Q.Cuhupcua $_{17}$	37	12		5817.5260	15.9278

Intercalary year of SUHUSA					*Ata cycle: 2*	
☾	Z	A	R	✷	Days	Years
198	Q.Suhusa $_{18}$	1	1	♄	5847.0566	16.0087
199	Q.Aca $_{19}$	2	2		5876.5872	16.0895
200	Gueta $_{20}$	3	3	z_{10}	5906.1178	16.1704
201	Ata $_{1}$	4	4		5935.6484	16.2513
202	Bosa $_{2}$	5	5		5965.1790	16.3321
203	Mica $_{3}$	6	6		5994.7096	16.4130
204	Muihica $_{4}$	7	7		6024.2402	16.4938
205	Hisca $_{5}$	8	8		6053.7707	16.5747
206	Ta $_{6}$	9	9		6083.3013	16.6555
207	Cuhupcua $_{7}$	10	10		6112.8319	16.7364
208	Suhusa $_{8}$	11	11		6142.3625	16.8172
209	Aca $_{9}$	12	12		6171.8931	16.8981
210	Ubchihica$_{10}$	13	1	♄	6201.4237	16.9789
211	Q.Ata $_{11}$	14	2		6230.9543	17.0598
212	Q.Bosa $_{12}$	15	3		6260.4849	17.1406
213	Q.Mica $_{13}$	16	4		6290.0155	17.2215
214	Q.Muihica $_{14}$	17	5		6319.5460	17.3023
215	Q.Hisca $_{15}$	18	6		6349.0766	17.3832
216	Q.Ta $_{16}$	19	7		6378.6072	17.4640
217	Q.Cuhupcua $_{17}$	20	8		6408.1378	17.5449
218	Q.Suhusa $_{18}$	21	9		6437.6684	17.6257
219	Q.Aca $_{19}$	22	10		6467.1990	17.7066
220	Gueta $_{20}$	23	11	z_{11}	6496.7296	17.7874
221	Ata $_{1}$	24	12		6526.2602	17.8683
222	Bosa $_{2}$	25	13	a_6	6555.7908	17.9491
223	Mica $_{3}$	26	1	♄	6585.3213	18.0300
224	Muihica $_{4}$	27	2		6614.8519	18.1108
225	Hisca $_{5}$	28	3		6644.3825	18.1917
226	Ta $_{6}$	29	4		6673.9131	18.2726
227	Cuhupcua $_{7}$	30	5		6703.4437	18.3534
228	Suhusa $_{8}$	31	6		6732.9743	18.4343
229	Aca $_{9}$	32	7		6762.5049	18.5151
230	Ubchihica$_{10}$	33	8		6792.0355	18.5960
231	Q.Ata $_{11}$	34	9		6821.5661	18.6768
232	Q.Bosa $_{12}$	35	10		6851.0966	18.7577
233	Q.Mica $_{13}$	36	11		6880.6272	18.8385
234	Q.Muihica $_{14}$	37	12		6910.1578	18.9194
1st Supplementary series						
235	Q.Hisca $_{15}$	1	1	♄	6939.6884	19.0002
236	Q.Ta $_{16}$	2	2		6969.2190	19.0811
237	Q.Cuhupcua $_{17}$	3	3		6998.7496	19.1619
238	Q.Suhusa $_{18}$	4	4		7028.2802	19.2428

	Intercalary year of ACA					*Ata cycle: 2*
☾	Z	A	R	✳	Days	Years
239	Q.Aca $_{19}$	1	5		7057.8108	19.3236
240	Gueta $_{20}$	2	6	z_{12}	7087.3414	19.4045
241	Ata $_{1}$	3	7		7116.8719	19.4853
242	Bosa $_{2}$	4	8		7146.4025	19.5662
243	Mica $_{3}$	5	9		7175.9331	19.6470
244	Muihica $_{4}$	6	10		7205.4637	19.7279
245	Hisca $_{5}$	7	11		7234.9943	19.8087
246	Ta $_{6}$	8	12		7264.5249	19.8896
247	Cuhupcua $_{7}$	9	1	♄	7294.0555	19.9704
248	Suhusa $_{8}$	10	2		7323.5861	20.0513
249	Aca $_{9}$	11	3		7353.1167	20.1321
250	Ubchihica$_{10}$	12	4		7382.6472	20.2130
251	Q.Ata $_{11}$	13	5		7412.1778	20.2939
252	Q.Bosa $_{12}$	14	6		7441.7084	20.3747
253	Q.Mica $_{13}$	15	7		7471.2390	20.4556
254	Q.Muihica $_{14}$	16	8		7500.7696	20.5364
255	Q.Hisca $_{15}$	17	9		7530.3002	20.6173
256	Q.Ta $_{16}$	18	10		7559.8308	20.6981
257	Q.Cuhupcua $_{17}$	19	11		7589.3614	20.7790
258	Q.Suhusa $_{18}$	20	12		7618.8920	20.8598
259	Q.Aca $_{19}$	21	13	a_7	7648.4226	20.9407
260	Gueta $_{20}$	22	1	z_{13},♄	7677.9531	21.0215
261	Ata $_{1}$	23	2		7707.4837	21.1024
262	Bosa $_{2}$	24	3		7737.0143	21.1832
263	Mica $_{3}$	25	4		7766.5449	21.2641
264	Muihica $_{4}$	26	5		7796.0755	21.3449
265	Hisca $_{5}$	27	6		7825.6061	21.4258
266	Ta $_{6}$	28	7		7855.1367	21.5066
267	Cuhupcua $_{7}$	29	8		7884.6673	21.5875
268	Suhusa $_{8}$	30	9		7914.1979	21.6683
269	Aca $_{9}$	31	10		7943.7284	21.7492
270	Ubchihica$_{10}$	32	11		7973.2590	21.8300
271	Q.Ata $_{11}$	33	12		8002.7896	21.9109
272	Q.Bosa $_{12}$	34	1	♄	8032.3202	21.9917
273	Q.Mica $_{13}$	35	2		8061.8508	22.0726
274	Q.Muihica $_{14}$	36	3		8091.3814	22.1534
275	Q.Hisca $_{15}$	37	4		8120.9120	22.2343
	2nd Supplementary series					
276	Q.Ta $_{16}$	1	5		8150.4426	22.3152
277	Q.Cuhupcua $_{17}$	2	6		8179.9732	22.3960
278	Q.Suhusa $_{18}$	3	7		8209.5037	22.4769
279	Q.Aca $_{19}$	4	8		8239.0343	22.5577

Intercalary year of UBCHIHICA						*Ata cycle: 2*
☾	Z	A	R	✱	Days	Years
280	Gueta $_{20}$	1	9	z_{14}	8268.5649	22.6386
281	Ata $_{1}$	2	10		8298.0955	22.7194
282	Bosa $_{2}$	3	11		8327.6261	22.8003
283	Mica $_{3}$	4	12		8357.1567	22.8811
284	Muihica $_{4}$	5	1	♂	8386.6873	22.9620
285	Hisca $_{5}$	6	2		8416.2179	23.0428
286	Ta $_{6}$	7	3		8445.7485	23.1237
287	Cuhupcua $_{7}$	8	4		8475.2790	23.2045
288	Suhusa $_{8}$	9	5		8504.8096	23.2854
289	Aca $_{9}$	10	6		8534.3402	23.3662
290	Ubchihica $_{10}$	11	7		8563.8708	23.4471
291	Q.Ata $_{11}$	12	8		8593.4014	23.5279
292	Q.Bosa $_{12}$	13	9		8622.9320	23.6088
293	Q.Mica $_{13}$	14	10		8652.4626	23.6896
294	Q.Muihica $_{14}$	15	11		8681.9932	23.7705
295	Q.Hisca $_{15}$	16	12		8711.5238	23.8513
296	Q.Ta $_{16}$	17	13	a_8	8741.0543	23.9322
297	Q.Cuhupcua $_{17}$	18	1	♂	8770.5849	24.0130
298	Q.Suhusa $_{18}$	19	2		8800.1155	24.0939
299	Q.Aca $_{19}$	20	3		8829.6461	24.1747
300	Gueta $_{20}$	21	4	z_{15}	8859.1767	24.2556
301	Ata $_{1}$	22	5		8888.7073	24.3365
302	Bosa $_{2}$	23	6		8918.2379	24.4173
303	Mica $_{3}$	24	7		8947.7685	24.4982
304	Muihica $_{4}$	25	8		8977.2991	24.5790
305	Hisca $_{5}$	26	9		9006.8296	24.6599
306	Ta $_{6}$	27	10		9036.3602	24.7407
307	Cuhupcua $_{7}$	28	11		9065.8908	24.8216
308	Suhusa $_{8}$	29	12		9095.4214	24.9024
309	Aca $_{9}$	30	1	♂	9124.9520	24.9833
310	Ubchihica $_{10}$	31	2		9154.4826	25.0641
311	Q.Ata $_{11}$	32	3		9184.0132	25.1450
312	Q.Bosa $_{12}$	33	4		9213.5438	25.2258
313	Q.Mica $_{13}$	34	5		9243.0744	25.3067
314	Q.Muihica $_{14}$	35	6		9272.6049	25.3875
315	Q.Hisca $_{15}$	36	7		9302.1355	25.4684
316	Q.Ta $_{16}$	37	8		9331.6661	25.5492
3^{d} Supplementary series						
317	Q.Cuhupcua $_{17}$	1	9		9361.1967	25.6301
318	Q.Suhusa $_{18}$	2	10		9390.7273	25.7109
319	Q.Aca $_{19}$	3	11		9420.2579	25.7918
320	Gueta $_{20}$	4	12	z_{16}	9449.7885	25.8726

Intercalary year of ATA						*Ata cycle: 3*
☾	Z	A	R	✱	Days	Years
321	Ata $_{1}$	1	1	♄	9479.3191	25.9535
322	Bosa $_{2}$	2	2		9508.8497	26.0343
323	Mica $_{3}$	3	3		9538.3802	26.1152
324	Muihica $_{4}$	4	4		9567.9108	26.1961
325	Hisca $_{5}$	5	5		9597.4414	26.2769
326	Ta $_{6}$	6	6		9626.9720	26.3578
327	Cuhupcua $_{7}$	7	7		9656.5026	26.4386
328	Suhusa $_{8}$	8	8		9686.0332	26.5195
329	Aca $_{9}$	9	9		9715.5638	26.6003
330	Ubchihica$_{10}$	10	10		9745.0944	26.6812
331	Q.Ata $_{11}$	11	11		9774.6250	26.7620
332	Q.Bosa $_{12}$	12	12		9804.1555	26.8429
333	Q.Mica $_{13}$	13	13	a_9	9833.6861	26.9237
334	Q.Muihica $_{14}$	14	1	♄	9863.2167	27.0046
335	Q.Hisca $_{15}$	15	2		9892.7473	27.0854
336	Q.Ta $_{16}$	16	3		9922.2779	27.1663
337	Q.Cuhupcua $_{17}$	17	4		9951.8085	27.2471
338	Q.Suhusa $_{18}$	18	5		9981.3391	27.3280
339	Q.Aca $_{19}$	19	6		10010.8697	27.4088
340	Gueta $_{20}$	20	7	z_{17}	10040.4003	27.4897
341	Ata $_{1}$	21	8		10069.9308	27.5705
342	Bosa $_{2}$	22	9		10099.4614	27.6514
343	Mica $_{3}$	23	10		10128.9920	27.7322
344	Muihica $_{4}$	24	11		10158.5226	27.8131
345	Hisca $_{5}$	25	12		10188.0532	27.8939
346	Ta $_{6}$	26	1	♄	10217.5838	27.9748
347	Cuhupcua $_{7}$	27	2		10247.1144	28.0556
348	Suhusa $_{8}$	28	3		10276.6450	28.1365
349	Aca $_{9}$	29	4		10306.1756	28.2174
350	Ubchihica$_{10}$	30	5		10335.7061	28.2982
351	Q.Ata $_{11}$	31	6		10365.2367	28.3791
352	Q.Bosa $_{12}$	32	7		10394.7673	28.4599
353	Q.Mica $_{13}$	33	8		10424.2979	28.5408
354	Q.Muihica $_{14}$	34	9		10453.8285	28.6216
355	Q.Hisca $_{15}$	35	10		10483.3591	28.7025
356	Q.Ta $_{16}$	36	11		10512.8897	28.7833
357	Q.Cuhupcua $_{17}$	37	12		10542.4203	28.8642

Intercalary year of SUHUSA						*Ata cycle: 3*
☾	Z	A	R	✳	*Days*	*Years*
358	Q.Suhusa $_{18}$	1	1	♄	10571.9509	28.9450
359	Q.Aca $_{19}$	2	2		10601.4815	29.0259
360	Gueta $_{20}$	3	3	z_{18}	10631.0120	29.1067
361	Ata $_{1}$	4	4		10660.5426	29.1876
362	Bosa $_{2}$	5	5		10690.0732	29.2684
363	Mica $_{3}$	6	6		10719.6038	29.3493
364	Muihica $_{4}$	7	7		10749.1344	29.4301
365	Hisca $_{5}$	8	8		10778.6650	29.5110
366	Ta $_{6}$	9	9		10808.1956	29.5918
367	Cuhupcua $_{7}$	10	10		10837.7262	29.6727
368	Suhusa $_{8}$	11	11		10867.2568	29.7535
369	Aca $_{9}$	12	12		10896.7873	29.8344
370	Ubchihica$_{10}$	13	13	a_{10},s_2	10926.3179	29.9152
371	Q.Ata $_{11}$	14	1	♄	10955.8485	29.9961
372	Q.Bosa $_{12}$	15	2		10985.3791	30.0769
373	Q.Mica $_{13}$	16	3		11014.9097	30.1578
374	Q.Muihica $_{14}$	17	4		11044.4403	30.2387
375	Q.Hisca $_{15}$	18	5		11073.9709	30.3195
376	Q.Ta $_{16}$	19	6		11103.5015	30.4004
377	Q.Cuhupcua $_{17}$	20	7		11133.0321	30.4812
378	Q.Suhusa $_{18}$	21	8		11162.5626	30.5621
379	Q.Aca $_{19}$	22	9		11192.0932	30.6429
380	Gueta $_{20}$	23	10	z_{19}	11221.6238	30.7238
381	Ata $_{1}$	24	11		11251.1544	30.8046
382	Bosa $_{2}$	25	12		11280.6850	30.8855
383	Mica $_{3}$	26	1	♄	11310.2156	30.9663
384	Muihica $_{4}$	27	2		11339.7462	31.0472
385	Hisca $_{5}$	28	3		11369.2768	31.1280
386	Ta $_{6}$	29	4		11398.8074	31.2089
387	Cuhupcua $_{7}$	30	5		11428.3379	31.2897
388	Suhusa $_{8}$	31	6		11457.8685	31.3706
389	Aca $_{9}$	32	7		11487.3991	31.4514
390	Ubchihica$_{10}$	33	8		11516.9297	31.5323
391	Q.Ata $_{11}$	34	9		11546.4603	31.6131
392	Q.Bosa $_{12}$	35	10		11575.9909	31.6940
393	Q.Mica $_{13}$	36	11		11605.5215	31.7748
394	Q.Muihica $_{14}$	37	12		11635.0521	31.8557
1st Supplementary series						
395	Q.Hisca $_{15}$	1	1	♄	11664.5827	31.9365
396	Q.Ta $_{16}$	2	2		11694.1132	32.0174
397	Q.Cuhupcua $_{17}$	3	3		11723.6438	32.0982
398	Q.Suhusa $_{18}$	4	4		11753.1744	32.1791

Intercalary year of ACA					*Ata cycle: 3*	
☾	Z	A	R	✳	Days	Years
399	Q.Aca $_{19}$	1	5		11782.7050	32.2600
400	Gueta $_{20}$	2	6	z_{20},ZC$_1$	11812.2356	32.3408
401	Ata $_1$	3	7		11841.7662	32.4217
402	Bosa $_2$	4	8		11871.2968	32.5025
403	Mica $_3$	5	9		11900.8274	32.5834
404	Muihica $_4$	6	10		11930.3580	32.6642
405	Hisca $_5$	7	11		11959.8885	32.7451
406	Ta $_6$	8	12		11989.4191	32.8259
407	Cuhupcua $_7$	9	13	a_{11}	12018.9497	32.9068
408	Suhusa $_8$	10	1	♅	12048.4803	32.9876
409	Aca $_9$	11	2		12078.0109	33.0685
410	Ubchihica$_{10}$	12	3		12107.5415	33.1493
411	Q.Ata $_{11}$	13	4		12137.0721	33.2302
412	Q.Bosa $_{12}$	14	5		12166.6027	33.3110
413	Q.Mica $_{13}$	15	6		12196.1333	33.3919
414	Q.Muihica $_{14}$	16	7		12225.6638	33.4727
415	Q.Hisca $_{15}$	17	8		12255.1944	33.5536
416	Q.Ta $_{16}$	18	9		12284.7250	33.6344
417	Q.Cuhupcua $_{17}$	19	10		12314.2556	33.7153
418	Q.Suhusa $_{18}$	20	11		12343.7862	33.7961
419	Q.Aca $_{19}$	21	12		12373.3168	33.8770
420	Gueta $_{20}$	22	1	z_{21},♅	12402.8474	33.9578
421	Ata $_1$	23	2		12432.3780	34.0387
422	Bosa $_2$	24	3		12461.9086	34.1195
423	Mica $_3$	25	4		12491.4391	34.2004
424	Muihica $_4$	26	5		12520.9697	34.2813
425	Hisca $_5$	27	6		12550.5003	34.3621
426	Ta $_6$	28	7		12580.0309	34.4430
427	Cuhupcua $_7$	29	8		12609.5615	34.5238
428	Suhusa $_8$	30	9		12639.0921	34.6047
429	Aca $_9$	31	10		12668.6227	34.6855
430	Ubchihica$_{10}$	32	11		12698.1533	34.7664
431	Q.Ata $_{11}$	33	12		12727.6839	34.8472
432	Q.Bosa $_{12}$	34	1	♅	12757.2144	34.9281
433	Q.Mica $_{13}$	35	2		12786.7450	35.0089
434	Q.Muihica $_{14}$	36	3		12816.2756	35.0898
435	Q.Hisca $_{15}$	37	4		12845.8062	35.1706
2^{nd} Supplementary series						
436	Q.Ta $_{16}$	1	5		12875.3368	35.2515
437	Q.Cuhupcua $_{17}$	2	6		12904.8674	35.3323
438	Q.Suhusa $_{18}$	3	7		12934.3980	35.4132
439	Q.Aca $_{19}$	4	8		12963.9286	35.4940

Intercalary year of UBCHIHICA					*Ata cycle: 3*	
☾	Z	A	R	✳	Days	Years
440	Gueta $_{20}$	1	9	z_{22}	12993.4592	35.5749
441	Ata $_{1}$	2	10		13022.9897	35.6557
442	Bosa $_{2}$	3	11		13052.5203	35.7366
443	Mica $_{3}$	4	12		13082.0509	35.8174
444	Muihica $_{4}$	5	13	a_{12}	13111.5815	35.8983
445	Hisca $_{5}$	6	1	♄	13141.1121	35.9791
446	Ta $_{6}$	7	2		13170.6427	36.0600
447	Cuhupcua $_{7}$	8	3		13200.1733	36.1408
448	Suhusa $_{8}$	9	4		13229.7039	36.2217
449	Aca $_{9}$	10	5		13259.2345	36.3026
450	Ubchihica$_{10}$	11	6		13288.7650	36.3834
451	Q.Ata $_{11}$	12	7		13318.2956	36.4643
452	Q.Bosa $_{12}$	13	8		13347.8262	36.5451
453	Q.Mica $_{13}$	14	9		13377.3568	36.6260
454	Q.Muihica $_{14}$	15	10		13406.8874	36.7068
455	Q.Hisca $_{15}$	16	11		13436.4180	36.7877
456	Q.Ta $_{16}$	17	12		13465.9486	36.8685
457	Q.Cuhupcua $_{17}$	18	1	♄	13495.4792	36.9494
458	Q.Suhusa $_{18}$	19	2		13525.0098	37.0302
459	Q.Aca $_{19}$	20	3		13554.5404	37.1111
460	Gueta $_{20}$	21	4	z_{23}	13584.0709	37.1919
461	Ata $_{1}$	22	5		13613.6015	37.2728
462	Bosa $_{2}$	23	6		13643.1321	37.3536
463	Mica $_{3}$	24	7		13672.6627	37.4345
464	Muihica $_{4}$	25	8		13702.1933	37.5153
465	Hisca $_{5}$	26	9		13731.7239	37.5962
466	Ta $_{6}$	27	10		13761.2545	37.6770
467	Cuhupcua $_{7}$	28	11		13790.7851	37.7579
468	Suhusa $_{8}$	29	12		13820.3157	37.8387
469	Aca $_{9}$	30	1	♄	13849.8462	37.9196
470	Ubchihica$_{10}$	31	2		13879.3768	38.0004
471	Q.Ata $_{11}$	32	3		13908.9074	38.0813
472	Q.Bosa $_{12}$	33	4		13938.4380	38.1621
473	Q.Mica $_{13}$	34	5		13967.9686	38.2430
474	Q.Muihica $_{14}$	35	6		13997.4992	38.3239
475	Q.Hisca $_{15}$	36	7		14027.0298	38.4047
476	Q.Ta $_{16}$	37	8		14056.5604	38.4856
3^{d} Supplementary series						
477	Q.Cuhupcua $_{17}$	1	9		14086.0910	38.5664
478	Q.Suhusa $_{18}$	2	10		14115.6215	38.6473
479	Q.Aca $_{19}$	3	11		14145.1521	38.7281
480	Gueta $_{20}$	4	12	z_{24}	14174.6827	38.8090

Intercalary year of ATA						*Ata cycle: 4*
☾	Z	A	R	✱	Days	Years
481	Ata $_{1}$	1	13	a_{13}	14204.2133	38.8898
482	Bosa $_{2}$	2	1	♄	14233.7439	38.9707
483	Mica $_{3}$	3	2		14263.2745	39.0515
484	Muihica $_{4}$	4	3		14292.8051	39.1324
485	Hisca $_{5}$	5	4		14322.3357	39.2132
486	Ta $_{6}$	6	5		14351.8663	39.2941
487	Cuhupcua $_{7}$	7	6		14381.3968	39.3749
488	Suhusa $_{8}$	8	7		14410.9274	39.4558
489	Aca $_{9}$	9	8		14440.4580	39.5366
490	Ubchihica$_{10}$	10	9		14469.9886	39.6175
491	Q.Ata $_{11}$	11	10		14499.5192	39.6983
492	Q.Bosa $_{12}$	12	11		14529.0498	39.7792
493	Q.Mica $_{13}$	13	12		14558.5804	39.8600
494	Q.Muihica $_{14}$	14	1	♄	14588.1110	39.9409
495	Q.Hisca $_{15}$	15	2		14617.6416	40.0217
496	Q.Ta $_{16}$	16	3		14647.1721	40.1026
497	Q.Cuhupcua $_{17}$	17	4		14676.7027	40.1834
498	Q.Suhusa $_{18}$	18	5		14706.2333	40.2643
499	Q.Aca $_{19}$	19	6		14735.7639	40.3452
500	Gueta $_{20}$	20	7	z_{25}	14765.2945	40.4260
501	Ata $_{1}$	21	8		14794.8251	40.5069
502	Bosa $_{2}$	22	9		14824.3557	40.5877
503	Mica $_{3}$	23	10		14853.8863	40.6686
504	Muihica $_{4}$	24	11		14883.4169	40.7494
505	Hisca $_{5}$	25	12		14912.9474	40.8303
506	Ta $_{6}$	26	1	♄	14942.4780	40.9111
507	Cuhupcua $_{7}$	27	2		14972.0086	40.9920
508	Suhusa $_{8}$	28	3		15001.5392	41.0728
509	Aca $_{9}$	29	4		15031.0698	41.1537
510	Ubchihica$_{10}$	30	5		15060.6004	41.2345
511	Q.Ata $_{11}$	31	6		15090.1310	41.3154
512	Q.Bosa $_{12}$	32	7		15119.6616	41.3962
513	Q.Mica $_{13}$	33	8		15149.1922	41.4771
514	Q.Muihica $_{14}$	34	9		15178.7227	41.5579
515	Q.Hisca $_{15}$	35	10		15208.2533	41.6388
516	Q.Ta $_{16}$	36	11		15237.7839	41.7196
517	Q.Cuhupcua $_{17}$	37	12		15267.3145	41.8005

Intercalary year of SUHUSA					*Ata cycle: 4*	
☾	Z	A	R	✳	Days	Years
518	Q.Suhusa $_{18}$	1	13	a_{14}	15296.8451	41.8813
519	Q.Aca $_{19}$	2	1	♄	15326.3757	41.9622
520	Gueta $_{20}$	3	2	z_{26}	15355.9063	42.0430
521	Ata $_{1}$	4	3		15385.4369	42.1239
522	Bosa $_{2}$	5	4		15414.9675	42.2047
523	Mica $_{3}$	6	5		15444.4980	42.2856
524	Muihica $_{4}$	7	6		15474.0286	42.3665
525	Hisca $_{5}$	8	7		15503.5592	42.4473
526	Ta $_{6}$	9	8		15533.0898	42.5282
527	Cuhupcua $_{7}$	10	9		15562.6204	42.6090
528	Suhusa $_{8}$	11	10		15592.1510	42.6899
529	Aca $_{9}$	12	11		15621.6816	42.7707
530	Ubchihica$_{10}$	13	12		15651.2122	42.8516
531	Q.Ata $_{11}$	14	1	♄	15680.7428	42.9324
532	Q.Bosa $_{12}$	15	2		15710.2733	43.0133
533	Q.Mica $_{13}$	16	3		15739.8039	43.0941
534	Q.Muihica $_{14}$	17	4		15769.3345	43.1750
535	Q.Hisca $_{15}$	18	5		15798.8651	43.2558
536	Q.Ta $_{16}$	19	6		15828.3957	43.3367
537	Q.Cuhupcua $_{17}$	20	7		15857.9263	43.4175
538	Q.Suhusa $_{18}$	21	8		15887.4569	43.4984
539	Q.Aca $_{19}$	22	9		15916.9875	43.5792
540	Gueta $_{20}$	23	10	z_{27}	15946.5181	43.6601
541	Ata $_{1}$	24	11		15976.0486	43.7409
542	Bosa $_{2}$	25	12		16005.5792	43.8218
543	Mica $_{3}$	26	1	♄	16035.1098	43.9026
544	Muihica $_{4}$	27	2		16064.6404	43.9835
545	Hisca $_{5}$	28	3		16094.1710	44.0643
546	Ta $_{6}$	29	4		16123.7016	44.1452
547	Cuhupcua $_{7}$	30	5		16153.2322	44.2260
548	Suhusa $_{8}$	31	6		16182.7628	44.3069
549	Aca $_{9}$	32	7		16212.2934	44.3878
550	Ubchihica$_{10}$	33	8		16241.8239	44.4686
551	Q.Ata $_{11}$	34	9		16271.3545	44.5495
552	Q.Bosa $_{12}$	35	10		16300.8851	44.6303
553	Q.Mica $_{13}$	36	11		16330.4157	44.7112
554	Q.Muihica $_{14}$	37	12		16359.9463	44.7920
1st Supplementary series						
555	Q.Hisca $_{15}$	1	13	a_{15},s_3	16389.4769	44.8729
556	Q.Ta $_{16}$	2	1	♄	16419.0075	44.9537
557	Q.Cuhupcua $_{17}$	3	2		16448.5381	45.0346
558	Q.Suhusa $_{18}$	4	3		16478.0687	45.1154

Intercalary year of ACA						*Ata cycle: 4*
☾	Z	A	R	✳	Days	Years
559	Q.Aca $_{19}$	1	4		16507.5993	45.1963
560	Gueta $_{20}$	2	5	z_{28}	16537.1298	45.2771
561	Ata $_{1}$	3	6		16566.6604	45.3580
562	Bosa $_{2}$	4	7		16596.1910	45.4388
563	Mica $_{3}$	5	8		16625.7216	45.5197
564	Muihica $_{4}$	6	9		16655.2522	45.6005
565	Hisca $_{5}$	7	10		16684.7828	45.6814
566	Ta $_{6}$	8	11		16714.3134	45.7622
567	Cuhupcua $_{7}$	9	12		16743.8440	45.8431
568	Suhusa $_{8}$	10	1	♄	16773.3746	45.9239
569	Aca $_{9}$	11	2		16802.9051	46.0048
570	Ubchihica $_{10}$	12	3		16832.4357	46.0856
571	Q.Ata $_{11}$	13	4		16861.9663	46.1665
572	Q.Bosa $_{12}$	14	5		16891.4969	46.2473
573	Q.Mica $_{13}$	15	6		16921.0275	46.3282
574	Q.Muihica $_{14}$	16	7		16950.5581	46.4091
575	Q.Hisca $_{15}$	17	8		16980.0887	46.4899
576	Q.Ta $_{16}$	18	9		17009.6193	46.5708
577	Q.Cuhupcua $_{17}$	19	10		17039.1499	46.6516
578	Q.Suhusa $_{18}$	20	11		17068.6804	46.7325
579	Q.Aca $_{19}$	21	12		17098.2110	46.8133
580	Gueta $_{20}$	22	1	z_{29},♄	17127.7416	46.8942
581	Ata $_{1}$	23	2		17157.2722	46.9750
582	Bosa $_{2}$	24	3		17186.8028	47.0559
583	Mica $_{3}$	25	4		17216.3334	47.1367
584	Muihica $_{4}$	26	5		17245.8640	47.2176
585	Hisca $_{5}$	27	6		17275.3946	47.2984
586	Ta $_{6}$	28	7		17304.9252	47.3793
587	Cuhupcua $_{7}$	29	8		17334.4557	47.4601
588	Suhusa $_{8}$	30	9		17363.9863	47.5410
589	Aca $_{9}$	31	10		17393.5169	47.6218
590	Ubchihica $_{10}$	32	11		17423.0475	47.7027
591	Q.Ata $_{11}$	33	12		17452.5781	47.7835
592	Q.Bosa $_{12}$	34	13	a_{16}	17482.1087	47.8644
593	Q.Mica $_{13}$	35	1	♄	17511.6393	47.9452
594	Q.Muihica $_{14}$	36	2		17541.1699	48.0261
595	Q.Hisca $_{15}$	37	3		17570.7005	48.1069
2nd Supplementary series						
596	Q.Ta $_{16}$	1	4		17600.2310	48.1878
597	Q.Cuhupcua $_{17}$	2	5		17629.7616	48.2686
598	Q.Suhusa $_{18}$	3	6		17659.2922	48.3495
599	Q.Aca $_{19}$	4	7		17688.8228	48.4304

Intercalary year of UBCHIHICA						*Ata cycle: 4*
☾	Z	A	R	✳	Days	Years
600	Gueta $_{20}$	1	8	z_{30}	17718.3534	48.5112
601	Ata $_{1}$	2	9		17747.8840	48.5921
602	Bosa $_{2}$	3	10		17777.4146	48.6729
603	Mica $_{3}$	4	11		17806.9452	48.7538
604	Muihica $_{4}$	5	12		17836.4758	48.8346
605	Hisca $_{5}$	6	1	⫛	17866.0063	48.9155
606	Ta $_{6}$	7	2		17895.5369	48.9963
607	Cuhupcua $_{7}$	8	3		17925.0675	49.0772
608	Suhusa $_{8}$	9	4		17954.5981	49.1580
609	Aca $_{9}$	10	5		17984.1287	49.2389
610	Ubchihica$_{10}$	11	6		18013.6593	49.3197
611	Q.Ata $_{11}$	12	7		18043.1899	49.4006
612	Q.Bosa $_{12}$	13	8		18072.7205	49.4814
613	Q.Mica $_{13}$	14	9		18102.2511	49.5623
614	Q.Muihica $_{14}$	15	10		18131.7816	49.6431
615	Q.Hisca $_{15}$	16	11		18161.3122	49.7240
616	Q.Ta $_{16}$	17	12		18190.8428	49.8048
617	Q.Cuhupcua $_{17}$	18	1	⫛	18220.3734	49.8857
618	Q.Suhusa $_{18}$	19	2		18249.9040	49.9665
619	Q.Aca $_{19}$	20	3		18279.4346	50.0474
620	Gueta $_{20}$	21	4	z_{31}	18308.9652	50.1282
621	Ata $_{1}$	22	5		18338.4958	50.2091
622	Bosa $_{2}$	23	6		18368.0264	50.2899
623	Mica $_{3}$	24	7		18397.5569	50.3708
624	Muihica $_{4}$	25	8		18427.0875	50.4517
625	Hisca $_{5}$	26	9		18456.6181	50.5325
626	Ta $_{6}$	27	10		18486.1487	50.6134
627	Cuhupcua $_{7}$	28	11		18515.6793	50.6942
628	Suhusa $_{8}$	29	12		18545.2099	50.7751
629	Aca $_{9}$	30	13	a_{17}	18574.7405	50.8559
630	Ubchihica$_{10}$	31	1	⫛	18604.2711	50.9368
631	Q.Ata $_{11}$	32	2		18633.8017	51.0176
632	Q.Bosa $_{12}$	33	3		18663.3322	51.0985
633	Q.Mica $_{13}$	34	4		18692.8628	51.1793
634	Q.Muihica $_{14}$	35	5		18722.3934	51.2602
635	Q.Hisca $_{15}$	36	6		18751.9240	51.3410
636	Q.Ta $_{16}$	37	7		18781.4546	51.4219
3^{d} Supplementary series						
637	Q.Cuhupcua $_{17}$	1	8		18810.9852	51.5027
638	Q.Suhusa $_{18}$	2	9		18840.5158	51.5836
639	Q.Aca $_{19}$	3	10		18870.0464	51.6644
640	Gueta $_{20}$	4	11	z_{32}	18899.5770	51.7453

Intercalary year of ATA						*Ata cycle: 5*
☾	Z	A	R	✳	Days	Years
641	Ata $_{1}$	1	12		18929.1075	51.8261
642	Bosa $_{2}$	2	1	♄	18958.6381	51.9070
643	Mica $_{3}$	3	2		18988.1687	51.9878
644	Muihica $_{4}$	4	3		19017.6993	52.0687
645	Hisca $_{5}$	5	4		19047.2299	52.1495
646	Ta $_{6}$	6	5		19076.7605	52.2304
647	Cuhupcua $_{7}$	7	6		19106.2911	52.3112
648	Suhusa $_{8}$	8	7		19135.8217	52.3921
649	Aca $_{9}$	9	8		19165.3523	52.4730
650	Ubchihica$_{10}$	10	9		19194.8829	52.5538
651	Q.Ata $_{11}$	11	10		19224.4134	52.6347
652	Q.Bosa $_{12}$	12	11		19253.9440	52.7155
653	Q.Mica $_{13}$	13	12		19283.4746	52.7964
654	Q.Muihica $_{14}$	14	1	♄	19313.0052	52.8772
655	Q.Hisca $_{15}$	15	2		19342.5358	52.9581
656	Q.Ta $_{16}$	16	3		19372.0664	53.0389
657	Q.Cuhupcua $_{17}$	17	4		19401.5970	53.1198
658	Q.Suhusa $_{18}$	18	5		19431.1276	53.2006
659	Q.Aca $_{19}$	19	6		19460.6582	53.2815
660	Gueta $_{20}$	20	7	z_{33}	19490.1887	53.3623
661	Ata $_{1}$	21	8		19519.7193	53.4432
662	Bosa $_{2}$	22	9		19549.2499	53.5240
663	Mica $_{3}$	23	10		19578.7805	53.6049
664	Muihica $_{4}$	24	11		19608.3111	53.6857
665	Hisca $_{5}$	25	12		19637.8417	53.7666
666	Ta $_{6}$	26	13	a_{18}	19667.3723	53.8474
667	Cuhupcua $_{7}$	27	1	♄	19696.9029	53.9283
668	Suhusa $_{8}$	28	2		19726.4335	54.0091
669	Aca $_{9}$	29	3		19755.9640	54.0900
670	Ubchihica$_{10}$	30	4		19785.4946	54.1708
671	Q.Ata $_{11}$	31	5		19815.0252	54.2517
672	Q.Bosa $_{12}$	32	6		19844.5558	54.3325
673	Q.Mica $_{13}$	33	7		19874.0864	54.4134
674	Q.Muihica $_{14}$	34	8		19903.6170	54.4943
675	Q.Hisca $_{15}$	35	9		19933.1476	54.5751
676	Q.Ta $_{16}$	36	10		19962.6782	54.6560
677	Q.Cuhupcua $_{17}$	37	11		19992.2088	54.7368

Intercalary year of SUHUSA					*Ata cycle: 5*	
☾	Z	A	R	✱	Days	Years
678	Q.Suhusa $_{18}$	1	12		20021.7393	54.8177
679	Q.Aca $_{19}$	2	1	♄	20051.2699	54.8985
680	Gueta $_{20}$	3	2	z_{34}	20080.8005	54.9794
681	Ata $_{1}$	4	3		20110.3311	55.0602
682	Bosa $_{2}$	5	4		20139.8617	55.1411
683	Mica $_{3}$	6	5		20169.3923	55.2219
684	Muihica $_{4}$	7	6		20198.9229	55.3028
685	Hisca $_{5}$	8	7		20228.4535	55.3836
686	Ta $_{6}$	9	8		20257.9841	55.4645
687	Cuhupcua $_{7}$	10	9		20287.5146	55.5453
688	Suhusa $_{8}$	11	10		20317.0452	55.6262
689	Aca $_{9}$	12	11		20346.5758	55.7070
690	Ubchihica$_{10}$	13	12		20376.1064	55.7879
691	Q.Ata $_{11}$	14	1	♄	20405.6370	55.8687
692	Q.Bosa $_{12}$	15	2		20435.1676	55.9496
693	Q.Mica $_{13}$	16	3		20464.6982	56.0304
694	Q.Muihica $_{14}$	17	4		20494.2288	56.1113
695	Q.Hisca $_{15}$	18	5		20523.7594	56.1921
696	Q.Ta $_{16}$	19	6		20553.2899	56.2730
697	Q.Cuhupcua $_{17}$	20	7		20582.8205	56.3538
698	Q.Suhusa $_{18}$	21	8		20612.3511	56.4347
699	Q.Aca $_{19}$	22	9		20641.8817	56.5156
700	Gueta $_{20}$	23	10	z_{35}	20671.4123	56.5964
701	Ata $_{1}$	24	11		20700.9429	56.6773
702	Bosa $_{2}$	25	12		20730.4735	56.7581
703	Mica $_{3}$	26	13	a_{19}	20760.0041	56.8390
704	Muihica $_{4}$	27	1	♄	20789.5347	56.9198
705	Hisca $_{5}$	28	2		20819.0652	57.0007
706	Ta $_{6}$	29	3		20848.5958	57.0815
707	Cuhupcua $_{7}$	30	4		20878.1264	57.1624
708	Suhusa $_{8}$	31	5		20907.6570	57.2432
709	Aca $_{9}$	32	6		20937.1876	57.3241
710	Ubchihica$_{10}$	33	7		20966.7182	57.4049
711	Q.Ata $_{11}$	34	8		20996.2488	57.4858
712	Q.Bosa $_{12}$	35	9		21025.7794	57.5666
713	Q.Mica $_{13}$	36	10		21055.3100	57.6475
714	Q.Muihica $_{14}$	37	11		21084.8405	57.7283
1st Supplementary series						
715	Q.Hisca $_{15}$	1	12		21114.3711	57.8092
716	Q.Ta $_{16}$	2	1	♄	21143.9017	57.8900
717	Q.Cuhupcua $_{17}$	3	2		21173.4323	57.9709
718	Q.Suhusa $_{18}$	4	3		21202.9629	58.0517

Intercalary year of ACA					*Ata cycle: 5*	
☾	Z	A	R	✱	Days	Years
719	Q.Aca $_{19}$	1	4		21232.4935	58.1326
720	Gueta $_{20}$	2	5	z_{36}	21262.0241	58.2134
721	Ata $_{1}$	3	6		21291.5547	58.2943
722	Bosa $_{2}$	4	7		21321.0853	58.3751
723	Mica $_{3}$	5	8		21350.6158	58.4560
724	Muihica $_{4}$	6	9		21380.1464	58.5369
725	Hisca $_{5}$	7	10		21409.6770	58.6177
726	Ta $_{6}$	8	11		21439.2076	58.6986
727	Cuhupcua $_{7}$	9	12		21468.7382	58.7794
728	Suhusa $_{8}$	10	1	♅	21498.2688	58.8603
729	Aca $_{9}$	11	2		21527.7994	58.9411
730	Ubchihica$_{10}$	12	3		21557.3300	59.0220
731	Q.Ata $_{11}$	13	4		21586.8606	59.1028
732	Q.Bosa $_{12}$	14	5		21616.3911	59.1837
733	Q.Mica $_{13}$	15	6		21645.9217	59.2645
734	Q.Muihica $_{14}$	16	7		21675.4523	59.3454
735	Q.Hisca $_{15}$	17	8		21704.9829	59.4262
736	Q.Ta $_{16}$	18	9		21734.5135	59.5071
737	Q.Cuhupcua $_{17}$	19	10		21764.0441	59.5879
738	Q.Suhusa $_{18}$	20	11		21793.5747	59.6688
739	Q.Aca $_{19}$	21	12		21823.1053	59.7496
740	Gueta $_{20}$	22	13	z_{37},a_{20},S$_4$,AC$_1$	21852.6359	59.8305
741	Ata $_{1}$	23	1	♅	21882.1664	59.9113
742	Bosa $_{2}$	24	2		21911.6970	59.9922
743	Mica $_{3}$	25	3		21941.2276	60.0730
744	Muihica $_{4}$	26	4		21970.7582	60.1539
745	Hisca $_{5}$	27	5		22000.2888	60.2347
746	Ta $_{6}$	28	6		22029.8194	60.3156
747	Cuhupcua $_{7}$	29	7		22059.3500	60.3964
748	Suhusa $_{8}$	30	8		22088.8806	60.4773
749	Aca $_{9}$	31	9		22118.4112	60.5582
750	Ubchihica$_{10}$	32	10		22147.9418	60.6390
751	Q.Ata $_{11}$	33	11		22177.4723	60.7199
752	Q.Bosa $_{12}$	34	12		22207.0029	60.8007
753	Q.Mica $_{13}$	35	1	♅	22236.5335	60.8816
754	Q.Muihica $_{14}$	36	2		22266.0641	60.9624
755	Q.Hisca $_{15}$	37	3		22295.5947	61.0433
2nd Supplementary series						
756	Q.Ta $_{16}$	1	4		22325.1253	61.1241
757	Q.Cuhupcua $_{17}$	2	5		22354.6559	61.2050
758	Q.Suhusa $_{18}$	3	6		22384.1865	61.2858
759	Q.Aca $_{19}$	4	7		22413.7171	61.3667

Intercalary year of UBCHIHICA					*Ata cycle: 5*	
☾	Z	A	R	✳	Days	Years
760	Gueta $_{20}$	1	8	z_{38}	22443.2476	61.4475
761	Ata $_{1}$	2	9		22472.7782	61.5284
762	Bosa $_{2}$	3	10		22502.3088	61.6092
763	Mica $_{3}$	4	11		22531.8394	61.6901
764	Muihica $_{4}$	5	12		22561.3700	61.7709
765	Hisca $_{5}$	6	1	♄	22590.9006	61.8518
766	Ta $_{6}$	7	2		22620.4312	61.9326
767	Cuhupcua $_{7}$	8	3		22649.9618	62.0135
768	Suhusa $_{8}$	9	4		22679.4924	62.0943
769	Aca $_{9}$	10	5		22709.0229	62.1752
770	Ubchihica$_{10}$	11	6		22738.5535	62.2560
771	Q.Ata $_{11}$	12	7		22768.0841	62.3369
772	Q.Bosa $_{12}$	13	8		22797.6147	62.4177
773	Q.Mica $_{13}$	14	9		22827.1453	62.4986
774	Q.Muihica $_{14}$	15	10		22856.6759	62.5795
775	Q.Hisca $_{15}$	16	11		22886.2065	62.6603
776	Q.Ta $_{16}$	17	12		22915.7371	62.7412
777	Q.Cuhupcua $_{17}$	18	13	a_{21}	22945.2677	62.8220
778	Q.Suhusa $_{18}$	19	1	♄	22974.7982	62.9029
779	Q.Aca $_{19}$	20	2		23004.3288	62.9837
780	Gueta $_{20}$	21	3	z_{39}	23033.8594	63.0646
781	Ata $_{1}$	22	4		23063.3900	63.1454
782	Bosa $_{2}$	23	5		23092.9206	63.2263
783	Mica $_{3}$	24	6		23122.4512	63.3071
784	Muihica $_{4}$	25	7		23151.9818	63.3880
785	Hisca $_{5}$	26	8		23181.5124	63.4688
786	Ta $_{6}$	27	9		23211.0430	63.5497
787	Cuhupcua $_{7}$	28	10		23240.5735	63.6305
788	Suhusa $_{8}$	29	11		23270.1041	63.7114
789	Aca $_{9}$	30	12		23299.6347	63.7922
790	Ubchihica$_{10}$	31	1	♄	23329.1653	63.8731
791	Q.Ata $_{11}$	32	2		23358.6959	63.9539
792	Q.Bosa $_{12}$	33	3		23388.2265	64.0348
793	Q.Mica $_{13}$	34	4		23417.7571	64.1156
794	Q.Muihica $_{14}$	35	5		23447.2877	64.1965
795	Q.Hisca $_{15}$	36	6		23476.8183	64.2773
796	Q.Ta $_{16}$	37	7		23506.3488	64.3582
	3^{d} Supplementary series					
797	Q.Cuhupcua $_{17}$	1	8		23535.8794	64.4390
798	Q.Suhusa $_{18}$	2	9		23565.4100	64.5199
799	Q.Aca $_{19}$	3	10		23594.9406	64.6008
800	Gueta $_{20}$	4	11	z_{40},ZC$_{2}$	23624.4712	64.6816

B.2 Bxogonoa

Intercalary year of ATA						*Ata cycle: 24*
☾	Z	A	R	✳	Days	Years
3681	Ata $_{1}$	1	6		108702.0981	297.6162
3682	Bosa $_{2}$	2	7		108731.6287	297.6971
3683	Mica $_{3}$	3	8		108761.1593	297.7779
3684	Muihica $_{4}$	4	9		108790.6899	297.8588
3685	Hisca $_{5}$	5	10		108820.2205	297.9396
3686	Ta $_{6}$	6	11		108849.7511	298.0205
3687	Cuhupcua $_{7}$	7	12		108879.2816	298.1013
3688	Suhusa $_{8}$	8	1	♄	108908.8122	298.1822
3689	Aca $_{9}$	9	2		108938.3428	298.2631
3690	Ubchihica$_{10}$	10	3		108967.8734	298.3439
3691	Q.Ata $_{11}$	11	4		108997.4040	298.4248
3692	Q.Bosa $_{12}$	12	5		109026.9346	298.5056
3693	Q.Mica $_{13}$	13	6		109056.4652	298.5865
3694	Q.Muihica $_{14}$	14	7		109085.9958	298.6673
3695	Q.Hisca $_{15}$	15	8		109115.5264	298.7482
3696	Q.Ta $_{16}$	16	9		109145.0569	298.8290
3697	Q.Cuhupcua $_{17}$	17	10		109174.5875	298.9099
3698	Q.Suhusa $_{18}$	18	11		109204.1181	298.9907
3699	Q.Aca $_{19}$	19	12		109233.6487	299.0716
3700	Gueta $_{20}$	20	13	z_{185},a_{100},S_{20},AC_5,B_1	109263.1793	299.1524
3701	Ata $_{1}$	21	1	♄	109292.7099	299.2333
3702	Bosa $_{2}$	22	2		109322.2405	299.3141
3703	Mica $_{3}$	23	3		109351.7711	299.3950
3704	Muihica $_{4}$	24	4		109381.3017	299.4758
3705	Hisca $_{5}$	25	5		109410.8322	299.5567
3706	Ta $_{6}$	26	6		109440.3628	299.6375
3707	Cuhupcua $_{7}$	27	7		109469.8934	299.7184
3708	Suhusa $_{8}$	28	8		109499.4240	299.7992
3709	Aca $_{9}$	29	9		109528.9546	299.8801
3710	Ubchihica$_{10}$	30	10		109558.4852	299.9609
3711	Q.Ata $_{11}$	31	11		109588.0158	300.0418
3712	Q.Bosa $_{12}$	32	12		109617.5464	300.1226
3713	Q.Mica $_{13}$	33	1	♄	109647.0770	300.2035
3714	Q.Muihica $_{14}$	34	2		109676.6075	300.2844
3715	Q.Hisca $_{15}$	35	3		109706.1381	300.3652
3716	Q.Ta $_{16}$	36	4		109735.6687	300.4461
3717	Q.Cuhupcua $_{17}$	37	5		109765.1993	300.5269

B.3 Bochica's coming

Intercalary year of ACA					*Ata cycle: 93*	
☾	Z	A	R	✳	Days	Years
14799	Q.Aca $_{19}$	1	12		437023.1866	1196.5288
14800	Gueta $_{20}$	2	13	z_{740},a_{400},S_{80},ZC_{37},AC_{20},B_4	437052.7172	1196.6097
14801	Ata $_1$	3	1	♄	437082.2478	1196.6905
14802	Bosa $_2$	4	2		437111.7784	1196.7714
14803	Mica $_3$	5	3		437141.3090	1196.8523
14804	Muihica $_4$	6	4		437170.8396	1196.9331
14805	Hisca $_5$	7	5		437200.3701	1197.0140
14806	Ta $_6$	8	6		437229.9007	1197.0948
14807	Cuhupcua $_7$	9	7		437259.4313	1197.1757
14808	Suhusa $_8$	10	8		437288.9619	1197.2565
14809	Aca $_9$	11	9		437318.4925	1197.3374
14810	Ubchihica$_{10}$	12	10		437348.0231	1197.4182
14811	Q.Ata $_{11}$	13	11		437377.5537	1197.4991
14812	Q.Bosa $_{12}$	14	12		437407.0843	1197.5799
14813	Q.Mica $_{13}$	15	1	♄	437436.6149	1197.6608
14814	Q.Muihica $_{14}$	16	2		437466.1454	1197.7416
14815	Q.Hisca $_{15}$	17	3		437495.6760	1197.8225
14816	Q.Ta $_{16}$	18	4		437525.2066	1197.9033
14817	Q.Cuhupcua $_{17}$	19	5		437554.7372	1197.9842
14818	Q.Suhusa $_{18}$	20	6		437584.2678	1198.0650
14819	Q.Aca $_{19}$	21	7		437613.7984	1198.1459
14820	Gueta $_{20}$	22	8	z_{741}	437643.3290	1198.2267
14821	Ata $_1$	23	9		437672.8596	1198.3076
14822	Bosa $_2$	24	10		437702.3902	1198.3884
14823	Mica $_3$	25	11		437731.9207	1198.4693
14824	Muihica $_4$	26	12		437761.4513	1198.5501
14825	Hisca $_5$	27	1	♄	437790.9819	1198.6310
14826	Ta $_6$	28	2		437820.5125	1198.7118
14827	Cuhupcua $_7$	29	3		437850.0431	1198.7927
14828	Suhusa $_8$	30	4		437879.5737	1198.8736
14829	Aca $_9$	31	5		437909.1043	1198.9544
14830	Ubchihica$_{10}$	32	6		437938.6349	1199.0353
14831	Q.Ata $_{11}$	33	7		437968.1655	1199.1161
14832	Q.Bosa $_{12}$	34	8		437997.6960	1199.1970
14833	Q.Mica $_{13}$	35	9		438027.2266	1199.2778
14834	Q.Muihica $_{14}$	36	10		438056.7572	1199.3587
14835	Q.Hisca $_{15}$	37	11		438086.2878	1199.4395
2nd Supplementary series						
14836	Q.Ta $_{16}$	1	12		438115.8184	1199.5204
14837	Q.Cuhupcua $_{17}$	2	13	a_{401}	438145.3490	1199.6012
14838	Q.Suhusa $_{18}$	3	1	♄	438174.8796	1199.6821
14839	Q.Aca $_{19}$	4	2		438204.4102	1199.7629

B.4 29600 Moon cycle

Intercalary year of UBCHIHICA					*Ata cycle: 185*	
☾	Z	A	R	✳	Days	Years
29560	Gueta $_{20}$	1	10	z_{1478}	872924.2108	2389.9853
29561	Ata $_{1}$	2	11		872953.7414	2390.0662
29562	Bosa $_{2}$	3	12		872983.2720	2390.1470
29563	Mica $_{3}$	4	13	a_{799}	873012.8026	2390.2279
29564	Muihica $_{4}$	5	1	♅	873042.3332	2390.3087
29565	Hisca $_{5}$	6	2		873071.8638	2390.3896
29566	Ta $_{6}$	7	3		873101.3944	2390.4704
29567	Cuhupcua $_{7}$	8	4		873130.9250	2390.5513
29568	Suhusa $_{8}$	9	5		873160.4556	2390.6321
29569	Aca $_{9}$	10	6		873189.9861	2390.7130
29570	Ubchihica$_{10}$	11	7		873219.5167	2390.7938
29571	Q.Ata $_{11}$	12	8		873249.0473	2390.8747
29572	Q.Bosa $_{12}$	13	9		873278.5779	2390.9555
29573	Q.Mica $_{13}$	14	10		873308.1085	2391.0364
29574	Q.Muihica $_{14}$	15	11		873337.6391	2391.1172
29575	Q.Hisca $_{15}$	16	12		873367.1697	2391.1981
29576	Q.Ta $_{16}$	17	1	♅	873396.7003	2391.2789
29577	Q.Cuhupcua $_{17}$	18	2		873426.2309	2391.3598
29578	Q.Suhusa $_{18}$	19	3		873455.7614	2391.4406
29579	Q.Aca $_{19}$	20	4		873485.2920	2391.5215
29580	Gueta $_{20}$	21	5	z_{1479}	873514.8226	2391.6024
29581	Ata $_{1}$	22	6		873544.3532	2391.6832
29582	Bosa $_{2}$	23	7		873573.8838	2391.7641
29583	Mica $_{3}$	24	8		873603.4144	2391.8449
29584	Muihica $_{4}$	25	9		873632.9450	2391.9258
29585	Hisca $_{5}$	26	10		873662.4756	2392.0066
29586	Ta $_{6}$	27	11		873692.0062	2392.0875
29587	Cuhupcua $_{7}$	28	12		873721.5367	2392.1683
29588	Suhusa $_{8}$	29	1	♅	873751.0673	2392.2492
29589	Aca $_{9}$	30	2		873780.5979	2392.3300
29590	Ubchihica$_{10}$	31	3		873810.1285	2392.4109
29591	Q.Ata $_{11}$	32	4		873839.6591	2392.4917
29592	Q.Bosa $_{12}$	33	5		873869.1897	2392.5726
29593	Q.Mica $_{13}$	34	6		873898.7203	2392.6534
29594	Q.Muihica $_{14}$	35	7		873928.2509	2392.7343
29595	Q.Hisca $_{15}$	36	8		873957.7815	2392.8151
29596	Q.Ta $_{16}$	37	9		873987.3120	2392.8960
3^{d} Supplementary series						
29597	Q.Cuhupcua $_{17}$	1	10		874016.8426	2392.9768
29598	Q.Suhusa $_{18}$	2	11		874046.3732	2393.0577
29599	Q.Aca $_{19}$	3	12		874075.9038	2393.1385
29600	Gueta $_{20}$	4	13	z_{1480},a_{800},S_{160},ZC_{74},AC_{40},B_{8}	874105.4344	2393.2194

B.5 Bochica's dream

Intercalary year of ACA						*Ata cycle: 463*
☾	Z	A	R	✱	Days	Years
73999	Q.Aca $_{19}$	1	12		2185234.0554	5982.9676
74000	Gueta $_{20}$	2	13	z_{3700},a_{2000},S_{400},ZC_{185},AC_{100},B_{20}	2185263.5860	5983.0485
74001	Ata $_{1}$	3	1	♄	2185293.1166	5983.1293
74002	Bosa $_{2}$	4	2		2185322.6472	5983.2102
74003	Mica $_{3}$	5	3		2185352.1778	5983.2910
74004	Muihica $_{4}$	6	4		2185381.7084	5983.3719
74005	Hisca $_{5}$	7	5		2185411.2389	5983.4527
74006	Ta $_{6}$	8	6		2185440.7695	5983.5336
74007	Cuhupcua $_{7}$	9	7		2185470.3001	5983.6144
74008	Suhusa $_{8}$	10	8		2185499.8307	5983.6953
74009	Aca $_{9}$	11	9		2185529.3613	5983.7762
74010	Ubchihica$_{10}$	12	10		2185558.8919	5983.8570
74011	Q.Ata $_{11}$	13	11		2185588.4225	5983.9379
74012	Q.Bosa $_{12}$	14	12		2185617.9531	5984.0187
74013	Q.Mica $_{13}$	15	1	♄	2185647.4837	5984.0996
74014	Q.Muihica $_{14}$	16	2		2185677.0142	5984.1804
74015	Q.Hisca $_{15}$	17	3		2185706.5448	5984.2613
74016	Q.Ta $_{16}$	18	4		2185736.0754	5984.3421
74017	Q.Cuhupcua $_{17}$	19	5		2185765.6060	5984.4230
74018	Q.Suhusa $_{18}$	20	6		2185795.1366	5984.5038
74019	Q.Aca $_{19}$	21	7		2185824.6672	5984.5847
74020	Gueta $_{20}$	22	8	z_{3701}	2185854.1978	5984.6655
74021	Ata $_{1}$	23	9		2185883.7284	5984.7464
74022	Bosa $_{2}$	24	10		2185913.2590	5984.8272
74023	Mica $_{3}$	25	11		2185942.7895	5984.9081
74024	Muihica $_{4}$	26	12		2185972.3201	5984.9889
74025	Hisca $_{5}$	27	1	♄	2186001.8507	5985.0698
74026	Ta $_{6}$	28	2		2186031.3813	5985.1506
74027	Cuhupcua $_{7}$	29	3		2186060.9119	5985.2315
74028	Suhusa $_{8}$	30	4		2186090.4425	5985.3123
74029	Aca $_{9}$	31	5		2186119.9731	5985.3932
74030	Ubchihica$_{10}$	32	6		2186149.5037	5985.4740
74031	Q.Ata $_{11}$	33	7		2186179.0343	5985.5549
74032	Q.Bosa $_{12}$	34	8		2186208.5649	5985.6357
74033	Q.Mica $_{13}$	35	9		2186238.0954	5985.7166
74034	Q.Muihica $_{14}$	36	10		2186267.6260	5985.7975
74035	Q.Hisca $_{15}$	37	11		2186297.1566	5985.8783
2nd Supplementary series						
74036	Q.Ta $_{16}$	1	12		2186326.6872	5985.9592
74037	Q.Cuhupcua $_{17}$	2	13	a_{2001}	2186356.2178	5986.0400
74038	Q.Suhusa $_{18}$	3	1	♄	2186385.7484	5986.1209
74039	Q.Aca $_{19}$	4	2		2186415.2790	5986.2017

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